

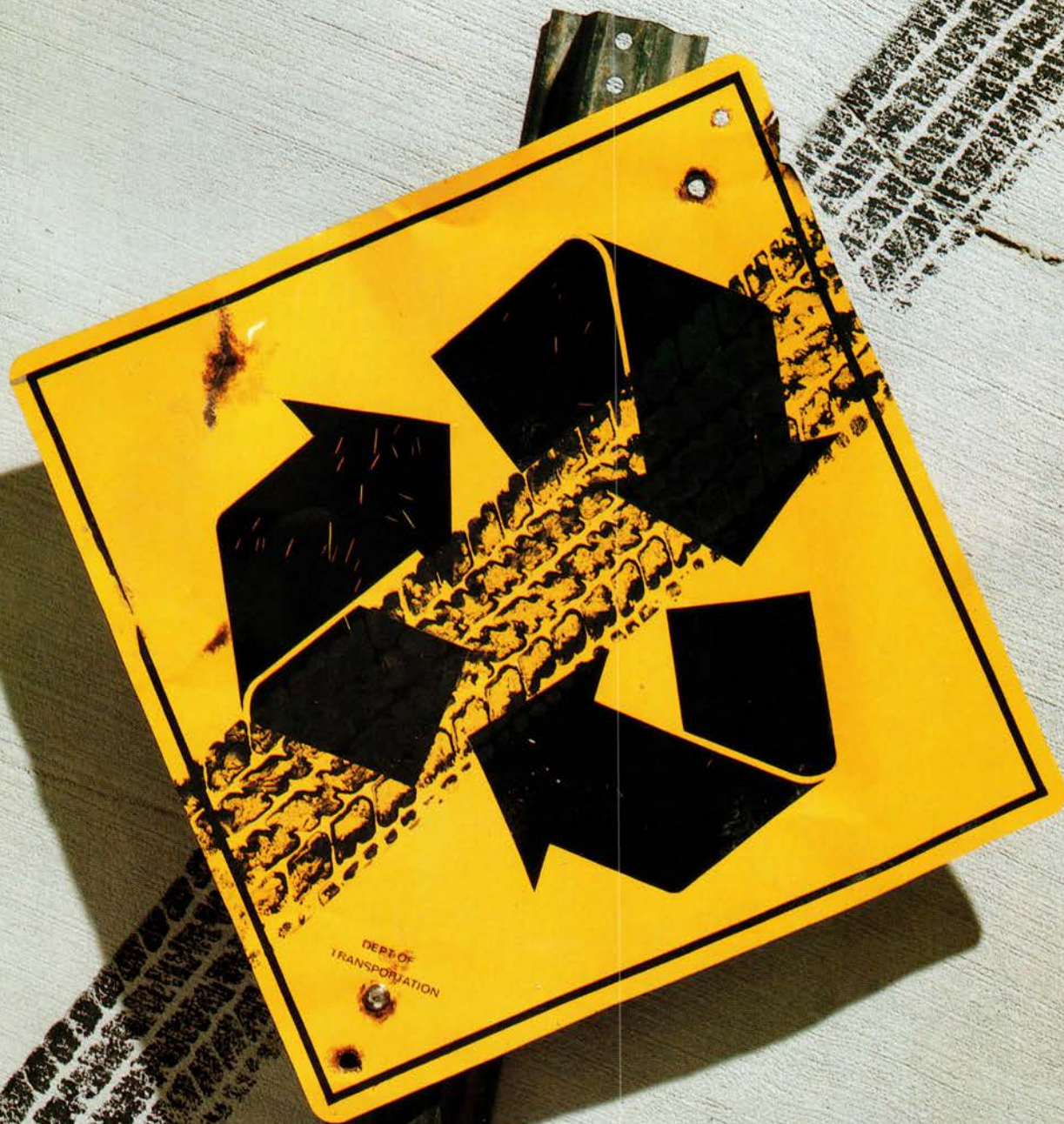
IN
THIS ISSUE:
POPULATION:
Realities for a finite planet

THE BUMPY ROAD TO TIRE RECYCLING

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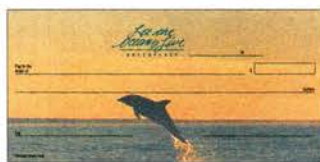
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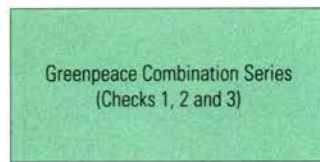
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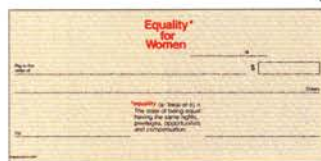
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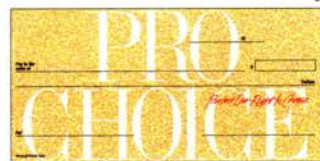
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CONTENTS

Vol. III No. 3

May/June 1991

FEATURES

THE BUMPY ROAD TO TIRE RECYCLING IN AMERICA

BY AMY MARTIN

From retreads to roadbeds,
retired tires are finding new uses.

28

DUMP PICKING FOR BEGINNERS

BY HANNAH HOLMES

Somewhere there's a dumpster with your name on it.
Dive in!

38

POPULATION

BY STEPHANIE MILLS

Red-hot realities for a finite planet.

46

DRIP IRRIGATION

BY ROBERT KOURIK

Sayonara, sprinklers —
we've got a better way to water the garden.

52

WHO OWNS EXXON? WE DO.

BY ART KLEINER

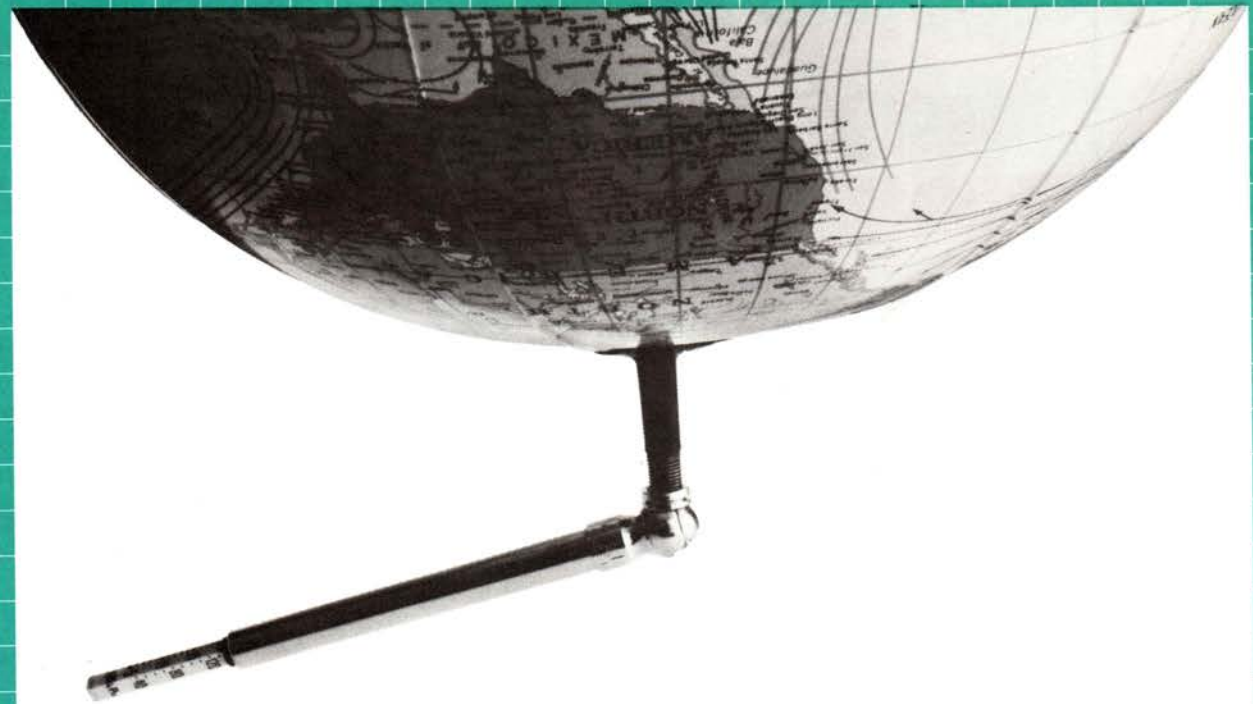
Pension funds have made stockholders out of most of us.
But can we get into the boardroom?

56

DEPARTMENTS

6 ... FROM THE EDITOR	GARBAGE INDEX ... 63
8 ... LETTERS	KEEPERS ... 64
16 ... LIFTING THE LID	READER SERVICE ... 72
24 ... ASK GARBAGE	CLASSIFIEDS ... 76
44 ... REDUCE, REUSE, RECYCLE	IN THE DUMPSTER ... 80
RESTORATION ... 82	

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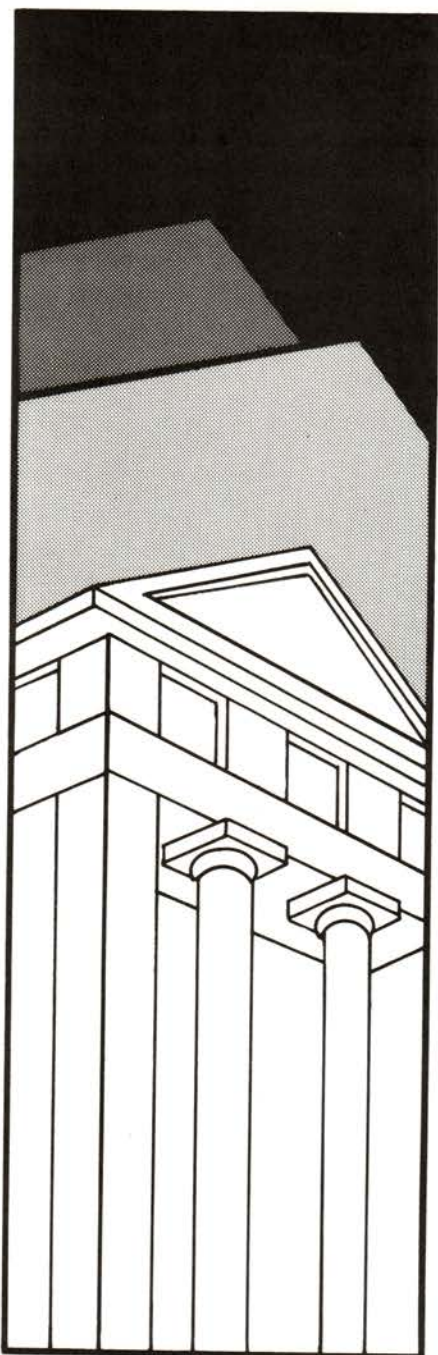
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GAR-5



Lots of Zeros

This month I considered the advantages of buying a building. But what would the right building cost? "I dunno, but it'll have a lot of zeros," my partner warned....

Writer Amy Martin went out to get the scoop on tires, and found the scrapped backlog was "three billion-with-a-b." Lots of zeros....

Stephanie Mills outlined the realities of overpopulation as an environmental issue. "In 1830, one billion people inhabited the Earth ... in 1960, it hit three billion; 15 years later, four billion; and by 1986 — only eleven years later — five billion...." Really a lot of zeros.

Everything, it seems, was too big for me this month. (Except my clothes ... the baby's seven months old but my clothes are still too small.) Like everyone else, I am overwhelmed by the scope and complexity of environmental problems. Individual action will take us only so far; political change has to follow.

I promised **GARBAGE** would not be a political magazine, and I meant it; we won't tell you how to vote. But some political decisions make assumptions about popular attitudes. For example, a chill has come over discussions of population policies, because eventually you run up against the A word, which is no longer an acceptable topic of conversation, thanks to a dedicated *minority* of anti-abortion activists who are extraordinarily successful at doing what their consciences tell them they must.

Then there's the new national energy plan. Its call to open up the Arctic Refuge and new offshore sites for oil exploration is at least debatable. What's beyond my comprehension is the lack of incentive for conservation or renewable-energy research. The plan calls for more oil production, more nuclear plants, but doesn't so much as ask for a tighter efficiency standard for cars. While polls indicate that over 70% of Americans consider themselves environmentalists, the energy plan suggests that there has been no shift

whatsoever in our collective attitudes. "Keep it cheap, waste it because there's always a way to make more."

Some sort of shift, on the other hand, was chronicled in *Time*. The magazine's April 8 cover headlines "The Simple Life," and tells us that "Americans, tired of trendiness and materialism, are rediscovering the joys of home life, basic values, and things that last." My interest was piqued ("oh my gosh," I thought, "are we ready to admit that people are sick of being sold things they don't need and lifestyles they don't want?"). The article was about a few hyperachievers who quit their jobs to stay home with the kids. (Of course, one had a \$50 million nest egg, and another bought the local grocery store on an impulse. Just normal folks.)

If I didn't know better, the *Time* article might have convinced me that this is a narrow, bi-coastal baby-boomer trend. (Economist John Kenneth Galbraith, who apparently thinks this simple-life thing is merely a fad, is quoted as saying, "I just think it's pure horseshit.") Yet the article uncovered some things in

spite of itself. Like a growing attachment to diaper service (instead of disposables) — indicating, perhaps, a desire to do the right thing; an affection for family time; a preference for safe, reliable cars.

If it is a fad, it's already a long time in coming: *CoEvolution Quarterly* (now called *Whole Earth Review*), whose articles always anticipate the mass media by a decade or two, devoted several issues to what they called "voluntary simplicity" 15 years ago. I think — or maybe I hope — that there's something here with more staying power, a change in attitude that will say no to ruining pristine wilderness for a longshot at finding oil that, at any rate, is guaranteed to run out. An attitude that says we'll drill if we have to, but let's look first at using less oil, not promoting the use of more.

Patricia Poore
Editor

COMING IN JULY/AUGUST
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Garbage Visionaries

What's Up, Dow?



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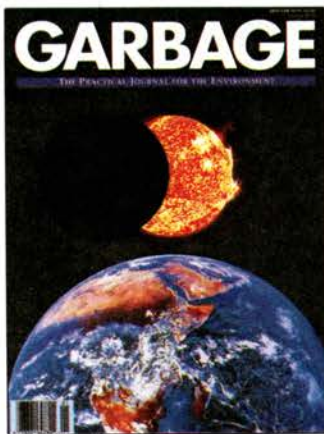
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Fish-Farm Follies ... To Tree Or Not To Tree ... GARBAGE Gets Her Goat ... The Truck Stops Here ... Antifreeze Addendum ...



Sunny Side Up

TILAPIA TROUBLE

Although John Reid's fish farming ["New Wave Fish Farmer" Jan/Feb] has a lot of merit, there are also some serious concerns about raising tilapia.

Tilapia were introduced in Florida in the 1960s for biological controls. It was mistakenly rumored at the time that they were also great game fish and they were "accidentally" released into ponds and lakes. Because of the Tilapia's rapid reproduction and tasty flavor, commercial and backyard fish farms flourished in south Florida. As individuals and companies went out of the fish-farming business, their remaining stock of fish was often dumped into nearby canals and ponds. The result today is that tilapia (and other exotic fish imported for fish farming) have seriously threatened, and in some cases replaced, native fish in Florida, especially throughout the Everglades.

Strict regulations need to be enforced to prevent a similar situation from occurring in other states.

Shirley Beccue
Bar Harbor, Me.

With all of the expertise on your editorial staff, one would think that one of you would have even some minor knowledge about how detrimental raising animals (and yes, fish are animals) for food is to our environment.

I hope this was just a one-time error in judgment by your editorial staff. True environmentalists don't just

want a cleaner environment — they want one where there is greater compassion for all living creatures. John Reid of Bioshelters appears not to care about the environment (or the fish) as much as he does about making a quick buck.

I will still recycle this issue of your magazine to the local library, but without this insensitive article.

B. Baxter
address unknown

Thank you for explaining what true environmentalists want. Our errors in judgment wouldn't do too much damage, would they, if there were more people like you who took on the task of cutting out the objectionable parts of the magazine before the public library got hold of it.

— P. Poore

SEEDS OF DISCONTENT

While I hesitate to voice a complaint about any article that advocates tree planting on some level and which otherwise was pretty darn good, I must say that Robert Kourik's "Burying the Myths of Tree Planting" [Jan/Feb] had some statements in its opening paragraphs that left a bitter taste in my mouth.

Kourik writes (regarding trees and global warming): "As a metaphor for affirmative action, planting a tree works. As a practical measure for cutting greenhouse gases, it's negligible."

Wow.

OK, sure — taken literally, the planting of one single tree may have "negligible"

results on greenhouse gases (if we are to consider the 13-20 pounds of CO₂ a year that a tree will take in as "negligible") — but, obviously, it's the cumulative total of gases that millions of trees will "breathe in" that is the benefit everyone's talking about. And the only way we are going to reach those millions is if we start planting now — even if it "only" means one single tree at a time.

Jim Hardie
Santa Monica, Calif.

Your article on the myths of tree planting skirted a troublesome issue. Enthusiastic tree planting can do great harm to an ecosystem, particularly to a "plant community." Those hills behind Mr. Seubert (photo, pages 42-43) appear to be barren, but they support the last vestiges of the plant communities that, before European contact, dominated the northern San Francisco peninsula; to plant trees there would upset the balance of an already pressured system in which several rare species are barely hanging on.

Those who would plant should conduct research or contact local native-plant societies so their efforts can go toward restoring and sustaining ecosystems, rather than further damaging them.

Greg Corning
San Francisco, Calif.

KEEP ON TRUCKIN'

The article "Truckin' Trash" was a story that needed to be told. How-

ENQUIRING EXAMINER

*Back-to-the-land
— with a vengeance!*

Rural terror: Utah farmer attacked by compost

by EDDIE PICA

Crapshoot, Utah — Farmer Dusty Stetson was killed early yesterday in a freak fertilizer accident when an out-of-control pile of compost (apparently located on a hazardous waste burial site) engulfed the hapless hayseed and turned him into rich, loamy soil in a matter of seconds. "Should've followed the instructions in GARBAGE," Stetson said.

Sunbelt Sunday Supplement

Letters to the Editor

Dear Editor: One of my grandsons back east sent me a gift subscription to a publication called GARBAGE. Naturally, I was expecting a magazine chock full of eastern media establishment liberal propaganda. Imagine my surprise, then, to find that GARBAGE is, in fact, as American as apple pie, the Fourth of July, and my coveted copy of Pat Boone's Greatest Hits. All right-thinking Americans should subscribe.

NEW YORK PEST

New Brooklyn mag sez:

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special to the Pest

A Brooklyn-based magazine is making an all-out effort to gain new readers, and the first step, sources say, is the use of phony newspaper clippings to fool unwary readers. "It could be construed as misleading," said one publishing exec. "Except they're making it extremely obvious. In fact, it's

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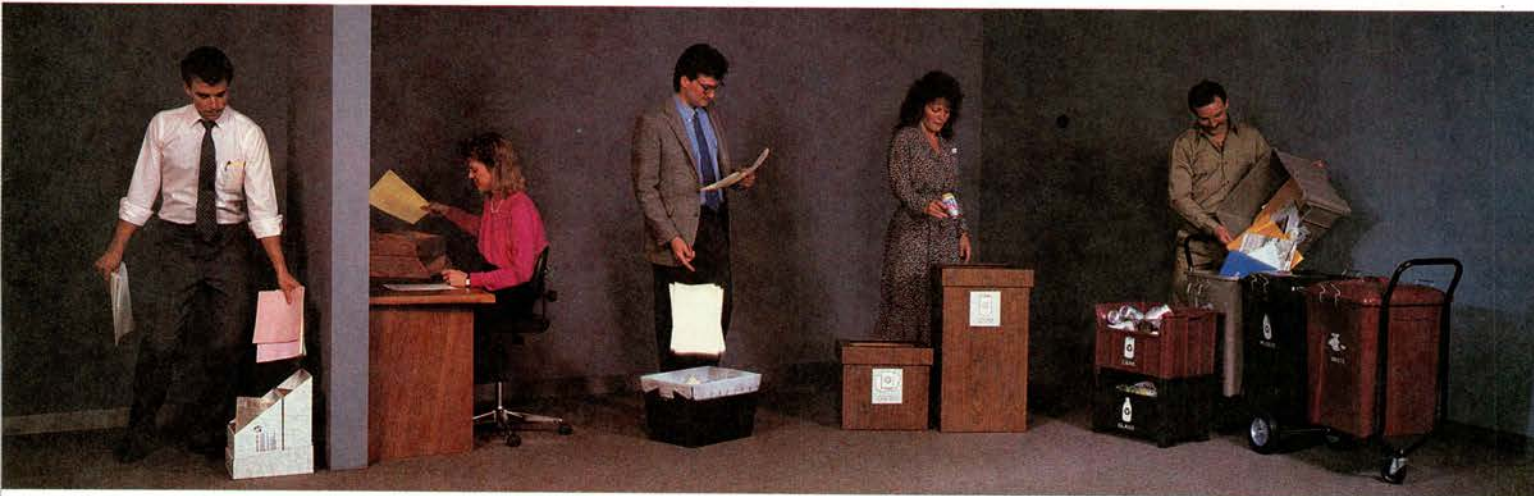
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ever, we do take exception with the statement "If Ohio and Indiana are going to take crepe soles and pharmaceuticals made in New Jersey, isn't it fair that they take some of New Jersey's garbage?" The state that produces [a given] product receives the profits and the employment. Give *our* state these [same] benefits — we will take care of the waste.

*Chuck Hudson, President
Green Hills Citizens for a
Clean Environment
Trenton, Mo.*

I had to comment on Bill Breen's article, "Truckin' Trash," in the Jan/Feb issue. A simple adjective in the second paragraph, describing the scent

of ripened garbage as "goatlike," destroyed my ability to concentrate on the rest of the article without attempting to enlighten Mr. Breen.

I've kept and bred goats for years. The does (slang name: nannies) and castrated males (wethers) are very clean, fastidious animals with NO NOTICE-ABLE ODOR of any kind. The bucks (billies) do have a musky odor during breeding season only — about six months of the year. This odor, while very strong, is as pleasant as a bouquet of flowers compared to a truckload of fermenting trash.

*Shirley Jarne
Grass Valley, Calif.*

PROPYLENE VS. ETHYLENE

In your Jan/Feb issue you listed propylene glycol-based antifreeze under new environmentally sound products ["Keepers"]. Although this material is less toxic than ethylene glycol, there are other problems associated with its use.

Both types of antifreeze may become contaminated with toxic heavy metals when used. Therefore, either substance may be considered a hazardous waste, depending on the levels of those metals. Propylene glycol is a contaminant in ethylene glycol antifreeze-recycling

programs. While ethylene glycol recycling is becoming more and more available, propylene glycol recycling currently is not. Therefore, the choice is to use a more toxic substance (prior to use) and recycle it, or use a less toxic substance and flush it down the drain.

*Michael Rubin
Redmond, Wash.*

WHAT GOES AROUND...

As a long-time user of tampons, I read with interest your report on their effects, both environmental and physiological ["The Truth About Tampons," Nov/Dec]. I have always



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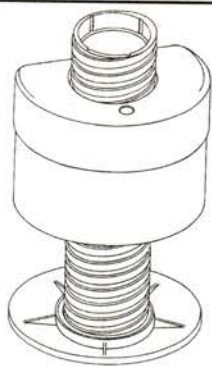
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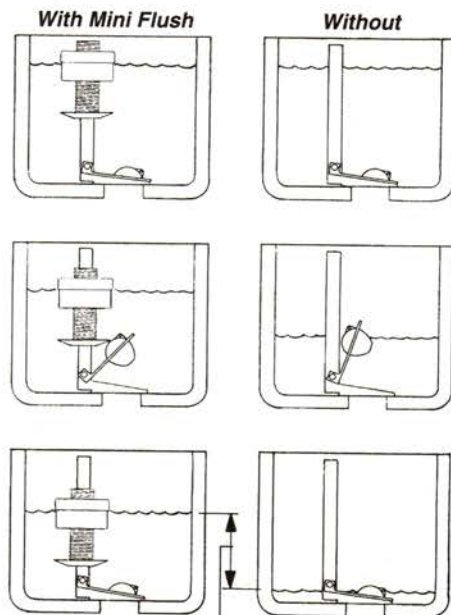
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deplored the single-use nature of the product, but I used them for want of a better system. Now, after reading about the chemical and synthetic content of tampons, I have stopped using them. My alternative is to cut up, use, launder, and re-use the cotton diapers I used on my babies. Ah, the cycle of life....

Rebecca Cohen
Winnetka, Ill.

BRONX CHEER

Your editorial ["Talk Talk Talk ... Jan/Feb] said it all! Thank God for a voice of reason!

I received a solicitation from the Nature Conservancy mourning the de-

feat of the Environmental Bond Act (in the 1990 New York State elections) — not even considering that New York voters might value the environment too highly to entrust it to state bureaucrats.

Owen D. Camp
Bronx, N.Y.

PLASTIC PROTEST

In your "Practical Journal," you used several pages to describe the mostly futile attempts at recycling plastics ["Recycling Plastics," Jan/Feb] but gave almost no practical advice on avoiding plastics. Disappointing.

Habib Rathle
Yuma, Ariz.

GETTING CARDED

Have enjoyed your magazine since its inception. I'm looking forward to the day ya'll get into the credit-card business. I would love to carry a Visa card with **GARBAGE** blaz-ing across the top.

M.A. Maxwell
Johnson City, Tenn.

TIRED, BUT SMART

Keep up the good work (a tired phrase, but appropriate with your fine magazine). There are only four publications that I lose sleep over (meaning I stay up half the night the day they arrive, reading them) — **GARBAGE**, *Old-House*

Journal, *National Geographic*, and *Consumer Reports*.

Thanks again for a great publication, and *don't* give in to the wild-eyed, foam-at-the-mouths from either fringe. Plain, simple discussion of complex issues is needed if we are to even try to solve our problems.

Anthony C. Hill
Yorba Linda, Calif.

CORRECTIONS

The water purifier shown on page 29 of the March/April issue is not a reverse-osmosis model, but a carbon-filtration model, made by Ametek.

The article "Home Water Purifiers" in the March/April issue misstated the price of Shaklee's Best Water System. It retails for \$375.

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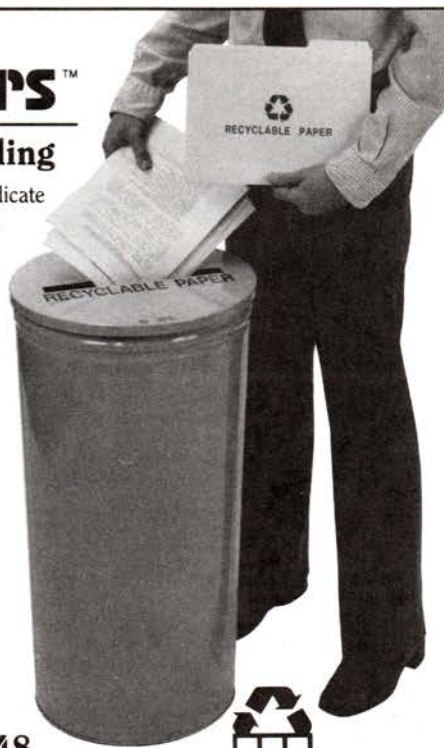


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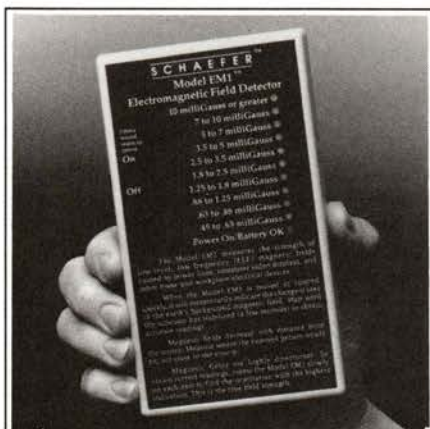
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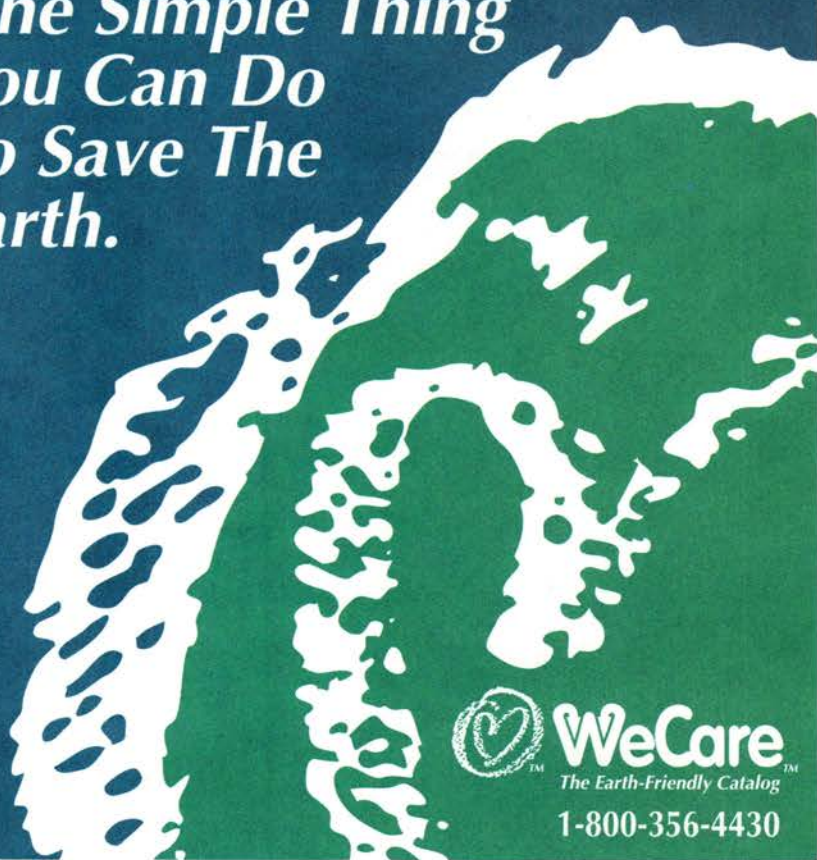
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G5/91

Pig-Time Farming

PROFILE

Boston farmer Lee Lawrence Albright and the family pet, Absolutely Lovely.

Absolutely Lovely weighs 175 pounds. She lives where patches of watermelon, pumpkin, strawberries, and raspberries lie hidden between the ribs of bedrock which typify New England farmland. She eats the trimmings from home-grown broccoli and eggplant which are too good for the compost pile.

All in all, Lovely is happy as a pig in ... Boston.

Consider her neighborhood: Brookline, where the streets are lined with stately brick houses and people shop at upscale stores. This is a wealthy neighborhood where most things conform. The family pet should be a golden retriever named Spence. But behind a grove of pine trees, this is where Lovely lives.

Welcome to Allandale Farm, the last working farm inside Boston city limits. It has been farmed continuously since the 1600s. Meet Lovely's family, the Lawrences, who have kept the 250-acre, classic Yankee homestead going since the 1800s. Meet the neighbors, who long ago gave up their tractors in favor of purring Volvos.

Lee Lawrence Albright, one of four Lawrences who still call the farm home, says her popularity dips whenever she spreads chicken manure over the fields. (The farm tries to avoid chemical fertilizers



and pesticides.) But giving city folks a whiff of what life is like down on the farm is one of Ms. Albright's objectives.

"Our feeling is that [open] land is unique [so] near an urban center. If we can keep this land open, we're making a big contribution," she says. This isn't something most people worry about in Massachusetts, where development pressure is powerful, and 50 percent of the state's farmland has been paved over and built up since the 1950s.

In a town where a quarter-acre plot can fetch \$200,000, Allandale Farm (worth hundreds of millions as builders' lots) gets its share of the development squeeze. The Lawrence family is determined to hang on, even though the farm requires annual earnings of \$375,000 to keep it from the auction block.

"It's difficult for a family — especially a couple of generations into it — to hold onto a project of this sort and maintain a working relationship with each other," says farm manager John Lee, related by marriage, who's seen the demise of other family farms in New England. One developer, who wanted to turn part of the farm into a golf course, offered each family member a house by a fairway and a free club membership.

Ms. Albright has other ideas. For 20 years she's run a preschool program at the farm, where city kids can soak up the open space, and gain some environmental awareness by seeing, firsthand, things like composting and recycling.

Besides Yankee grit and family harmony, what's kept the family farming? Lee Lawrence Albright credits state laws that encourage farmers to keep land under cultivation by threatening financial penalties and back taxes if property is taken out of an open-space program.

"These laws were designed to keep family farms going," she says. "Otherwise, I don't think you'd see a farm left in Massachusetts."

Let alone a pig in Boston. — Tom Verde

Tom Verde is a writer living in Boston. He's written for National Wildlife, Yankee, and National Public Radio.

• Juice Boxes Revisited

After Maine banned aseptic packages — those multi-layered, laminated juice boxes — in September 1990, two package makers got busy. Tetra-Pak and Combibloc quickly set up pilot recycling programs in six states, and took out full page ads in the *New York Times* and the *Wall Street Journal* to tell the world about it.

New York City's Department of Consumer Affairs also works quickly. Nineteen days after the ads ran, Consumer Affairs charged the juice-box makers with deceptive trade practices and ordered them to stop running the ads, which claim that juice boxes are easily recycled. In fact, there is no NYC facility for recycling the boxes.

FOR THE RECORD

"Perhaps GARBAGE isn't quite the absurdity it seemed. It's still being published..."

From a story about the demise of Campbell's Souper Combo, whose over-packaging landed it *In The Dumpster*. (Packaging Digest, February, '91)



GARBAGE DICTIONARY

Dump Duck, *noun*. No, it's not a breed of duck that waddles across garbage heaps, gobbling rubbish. "Dump ducks" is what Downeasters (that's folks who live on the coast of Maine, excluding yuppies) call gulls — sea gulls, chowderhead.

Why? Good question. "This is too modern for me," says John Gould, author of *Maine Lingo*. "When I was a boy, there were no sea gulls on the dump — people would never throw garbage [food waste] on the dump."

Bob Fernald, the sea-urchin diver from whom I first heard the term, is also at a loss, but he attempts a theory: "When I see a gull on the ocean it's a pretty bird. But when I see it in its usual context — fighting over french fries at McDonald's ... I don't know — 'dump gull' doesn't have the right ring to it."

Wordsmith Gould takes the new term in stride. "It's not surprising. Sea gulls get various names that don't belong to them," he says. "The fishermen call them shit-pokes. They don't like what gulls do on their decks."

— Hannah Holmes

FOR THE RECORD

"My foot is ozone friendly, but what does that mean?"

Andrew Stoeckle, environmental analyst, on Gillette Foamy's "ozone friendly, no CFCs" claim — CFCs have been banned from aerosols since 1978. (New York Times, March 11, '91)

• Sssh! Don't Tell Kodak!

Lake Ontario is Toronto's water supply. People cook with it, bathe in it, drink it — there are a thousand ways to use it.

Make that 1,001.

Toronto photographer Jeremy Lynch develops his photos with water taken from the lake. He doesn't spend money on pricey developers — Lake Ontario

contains enough of a chemical soup to do the job without Kodak's help.

"It has to do with hydroquinone," Mr. Lynch says. "It's a stabilizer in diesel fuel and paint thinner, and the main component in developer."

Mr. Lynch took water from 20 different parts of the lake before finding an area — near a shipyard — that worked. It takes him

about 28 hours to develop a Lake Ontario-immersed negative.

Now he's sampling the waters at other photogenic spots, like New York City Harbor, where a development time of 26 hours compares favorably with Toronto.

The best spot so far? "Love Canal," says Mr. Lynch. "It took three hours."

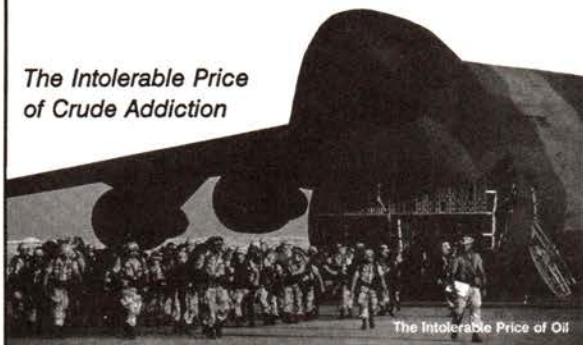
• PET of the Year

It's a new age in the Cola Wars: Both Coca-Cola and Pepsi have developed methods to recycle used PET plastic bottles into new PET bottles. Coke's technology has just been OK'd by the FDA. Pepsi expects to get the green light soon. Both companies promise to market bottles made partly from recycled plastic this year, making it the first time a recycled plastic is used for food containers.

Although PET is easily recycled into ski-jacket fill, carpeting, and other neat stuff, "closing the loop" — the process of recycling products into what they were the first time around — greatly reduces demand for fossil

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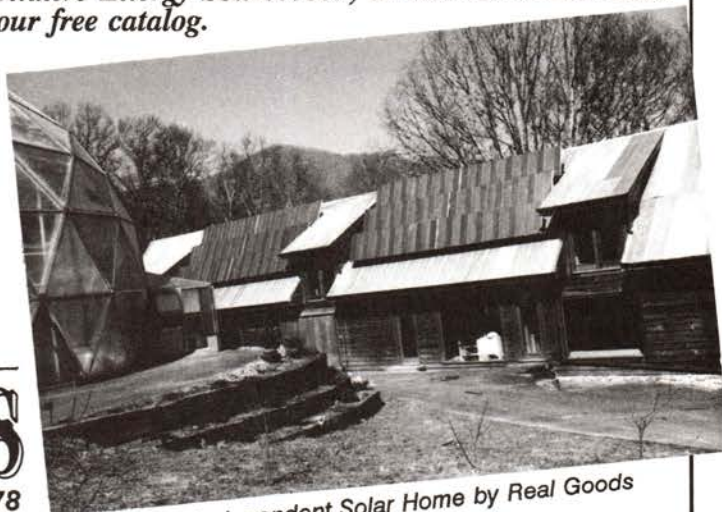
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FOR THE RECORD

“Ultimately, their kids will make them do it.”

George Dreckmann, Madison, Wis., recycling director, predicting that recycling-resistant parents will be won over. (Isthmus, Jan. 25, '91)

fuels and mineral additives. But simply shredding and washing a plastic like PET (polyethylene terephthalate) doesn't get it clean enough for food. The solution? Take apart the long-chain polymers that comprise PET (Pepsi calls it “unzipping”) and put them back together as new plastic.

Jackie Prince, staff scientist with the Environmental Defense Fund, says both soda companies use methanol and other benign solvents to break down the PET polymer. “The technology itself is fine,” says Ms. Prince. “It's a step in the right direction.”

Pepsi's bottles will originally contain 10- to 20-percent recycled plastic; Coke hasn't determined a ratio yet. Both companies say the real-world percentage depends on available supplies of used PET.

• Demographically Speaking ...

What type of person recycles? In Maine, country folks and older people are far more likely to sort and separate than under-35, citified types.

Barbara Nash of Market Decisions, Inc., which polled 400 Mainers, says that 56 percent of people 65 and over recycle, compared to 37 percent of those under 35. “Older people have the time, and ... they also feel pride and a responsibility to the state,” Ms. Nash says.

What's more, 48 percent of the state's rural people recycle, while city dwellers recycle at a wimpy 27-percent rate. The reason? Backwoods people know garbage. Many do their own trash hauling — to the town dump or the local transfer station — and they're sensitive to what's reusable, what's recyclable, and what gets tossed.

But there's plenty of room for improvement: 40 percent of the poll's respondents said that once it's picked up, they don't know what happens to their trash.

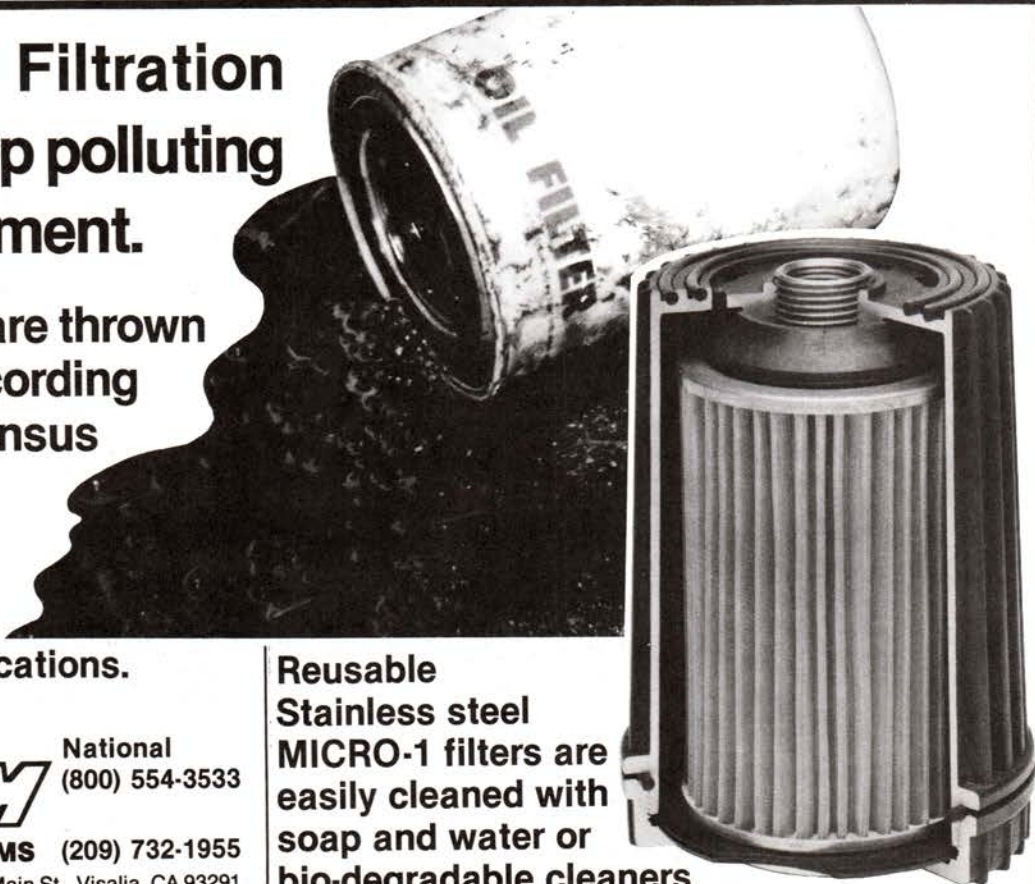
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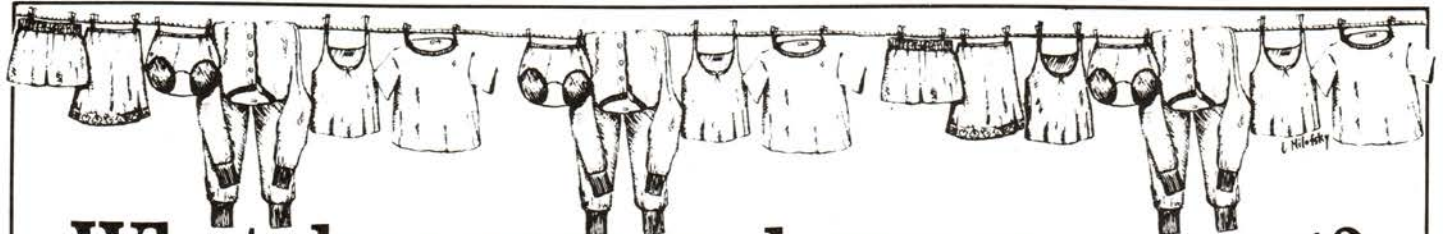


JOEL MAKOWER
with John Elkington and Julia Hailes

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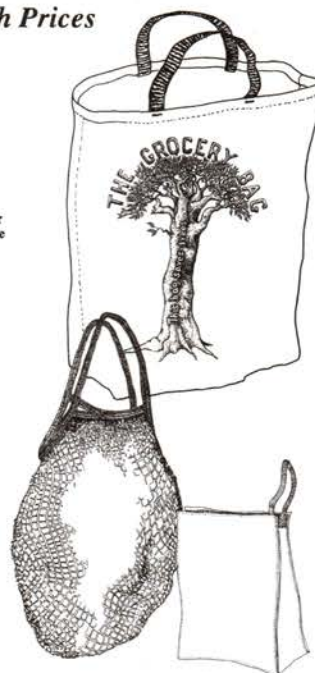
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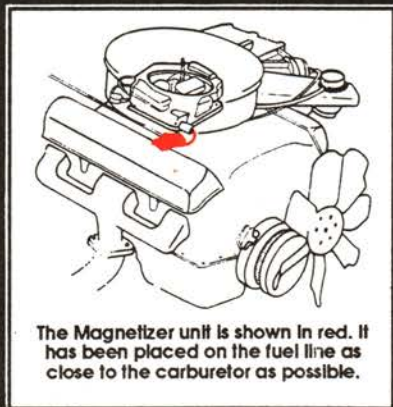
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use a sturdy, prefabricated bin with solid sides and a tight-sealing lid to keep unwanted critters — dogs, cats, and kids — out.

You'll reduce the chance of weird smells and ravenous animals if you skip the meat and bone scraps. Kitchen scraps are so moist and rich in nitrogen that they may become an anaerobic slime-pile, something more resembling the Creature from the Black Lagoon than pure forest loam. So you'll have to add dried grass clippings, leaves, straw, or shredded newspaper to keep the compost well aerated, and to balance the nitrogen with carbon.

All this is to say that composting in an apartment setting is problematic, at best. You'd be wiser to try red worms, a.k.a. "red wigglers," or *Lumbricus rubellus*, to digest your kitchen scraps. (Stay with me.) Worms don't take up much space. A two-foot by four-foot box will take care of the scraps of two to three adults (figure on one square foot of surface area in the worm bin for each pound-per-week of food scraps). Worms are circumspect. They do their thing in dark, not-too-cold places like the boiler room, under the kitchen sink, in the broom closet, on a utility porch, or in a garage. If you want to use the worm bin all year, make sure it doesn't freeze. Worms prefer temperatures above 50 degrees Fahrenheit.

Make bedding for the worms from strips of newspaper, corrugated cardboard, shredded office paper, sawdust, or leaves. The lid on the bin must be well sealed to keep out flies. Just dump your scraps under the bedding where the shy creatures reside. In less than a year, you'll have a very rich, concentrated organic fertilizer called "castings" (scientific talk for worm poop). If you don't have potted plants, wrap your castings in pretty paper, and present them to friends who have gardens. You don't even have to tell them what they're getting.

For extensive information on both composting and worming, see my article "Garbage to Compost," Nov/Dec 1989.

— Robert Kourik

Q: Being an apartment dweller, I don't have my own yard. What do you suggest I do with biodegradable waste? Can you discuss small-scale compost, too? (What goes with what, and where?)

Maira Malone
Queensbury, N.Y.

A: Tough problem. Compost bins, no matter how discreet, often just don't fit in on the grounds of apartment buildings. If the building super gives permission for some out-of-the-way place to make compost,

Q: I am very interested in acquiring a hand-push lawn mower, the old-fashioned kind without an engine. Do any companies offer new versions of these?

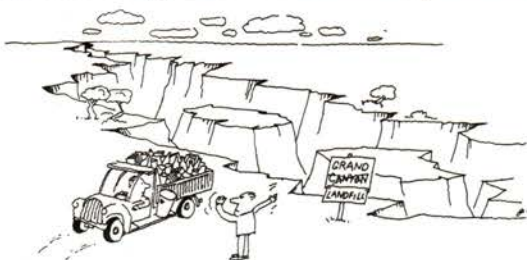
Jill Sculerati
San Angelo, Texas

A: Push mowers aren't exactly a thing of the past — you may not need to search further than your local hardware store or garden center.

The reasons to own a push mower are numerous: They're quiet, and they don't produce fumes. Their blades act like scissors, snip-

Worms do their thing in dark, not-too-cold places like the boiler room or under the sink.

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Keeping a push mower in motion burns enough calories to justify a bowl of ice cream.

ping the grass cleanly, whereas power-mower blades cut grass by hitting it hard at high speed, essentially ripping the tops off. The cleaner cut is less damaging to each blade of grass, reducing the number of places where disease can enter. Most important, keeping a push mower in motion burns between 400 and 500 calories per hour — enough to justify a large bowl of ice cream when the lawn is done.

Unlike the wooden T-handled versions from yesteryear, many of the new mowers feature metal-tub-

ing handles that can accommodate a bag for clippings (the debate over bagging vs. leaving clippings rages on). The height of the blades can also be adjusted. The prices range from about \$90 to \$200, plus shipping, which is in the \$10 range. If push mowers have been relegated to museum-artifact status in your community, you can buy one through the miracle of mail-order. The following catalogs carry them:

The Energy Store (battery chargers, bike trailers, energy- and water-saving do-dads), P.O. Box 3507, Dept. GM, Santa Cruz, CA 95063-3507; (800) 288-1938.

The Natural Gardening Company (gardening implements), 217 San Anselmo Ave., Dept. GM, San

Anselmo, CA 94960; (415) 456-5060.

Lehman's Non-Electric Catalog (butter churns, kettles, woodstoves, windmills, cherry pitters, etc. — a great read), 4779 Kidron Rd., P.O. Box 41, Dept. GM, Kidron, OH 44636; (216) 857-5441.

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Massive, durable and elastic, the scrap tires of today never seem to go away — to the point where three billion (that's billion-with-a-b) of them have accumulated in legal piles and illegal dumps across the nation. About two million of them are on Mr. and Mrs. Havenhill's rural property near Denton in north Texas, left by a renter they didn't monitor so well.

"We have a rubber albatross around our necks," says the spry Mrs. Havenhill, a retired librarian whose recommended reading list included *God's Own Junkyard*, a 1965 book on trash and landscape blight. Peeking out from the tall grass along the country lane to the Havenhill place, and mired along the banks of Hickory Creek downstream, the two million tires sprawl across acres of floodplain hidden behind brambles, barbed-wire fences, and milkweed riotously overgrown. But it's mid winter, and I can see the flash of a whitewall.

Past the fence, immense levies rise between the tires and the creek, and a moat has been carved to prevent the horror of a tire fire from spreading to the adjoining cattle farm. Dozens of

tire mounds reach to the tops of 50-year-old oaks. Rains have formed a maze of deep, brackish, litter-laced ponds stitched together by beaver dams and the trails of raccoons. Says Mrs. Havenhill, the understated prairie schoolmarm, "It's not pretty."

How did this happen? The Havenhills had a rent-to-buy agreement with the fellow and didn't think much about him or the property. Then one month, the check didn't come, and they discovered that he had run a profitable and illegal tire-disposal business on the side. The word disposal is a euphemism. Being both a fire hazard (tires are a petrochemical product) and a breeding haven for mosquitoes (they hold stagnant rainwater), the tires can't stay where they are. The Havenhills are responsible for legally disposing of them, at a current cost of about \$1 per tire. It's money they don't have.

So the Havenhills wait for their one hope: that markets for scrap tires and products made from them will improve to the point where they could at least give theirs away. Meanwhile, they keep the fire department's number close to the phone and trust that the creek won't rise over the levies.

★ TIRES KEEP ROLLING ALONG

United States drivers discard 234 million tires each year. Less than 15 percent are incinerated or, to a lesser extent, recycled. Four percent are shipped to other countries to meet much the same fate. The scrap-tire total would be even larger except that 44.5 million tires annually are divert-

ed to become retreads, or are picked from discards by eagle-eyed entrepreneurs who see a few more miles of road life. That leaves about 193 million tires, or about one percent of the entire waste stream, sitting around.

Why so many tossed-off tires, an average of one per person each year? We Americans may love our cars, own millions of them, and pour billions into them. But their tires we treat with disdain, getting an average of 40,000 miles when good maintenance practices could expand that to 80,000 or more. (See page 37.) We can be cavalier because the relatively low price of crude oil, along with domestic overproduction, makes tires cheap. Competition from imports further drives prices down, making the cost of an import tire often lower than a comparable retread. The popularity of the steel-belted radial, which is more difficult to recap, further put the passenger-car retread market in a 20-year decline, increasing the scrap-tire total.

It's not just the number of tires that's the problem; it's also the nature of the beast. Those characteristics that give us a smooth ride for thousands of miles — density, durability, elasticity — cause the disposal problem. If tires are buried in landfills without first being chopped into pieces, the hollow shape fills with decomposition gases. Vibrations of bulldozers make these buoyant disks unstable; dawn shifts at landfills have reported tires risen to the surface like mushrooms after a rain.

The errant tires leave behind "worm holes," impairing a landfill's

BY AMY MARTIN

in America

stable, carefully layered composition. And then, sometimes, a landfill tire goes rogue. If set at a steep angle and under pressure, squeezed by heavy equipment and tons of compacted landfill, tires have been known to shoot out with such force as to overturn machinery, sometimes seriously injuring drivers.

What are landfill operators to do? Ban the slippery suckers, that's what. Starting with Minnesota in 1985, more than 30 states now regulate tire disposal in one way or another. Some ban whole tires. Other states simply slap a fee on all tire disposals. "Cradle to grave" tire-manifest systems that track tire sales put the responsibility on tire generators and sellers to guarantee safe disposal of their product.

The regulations have, however, created a new problem — illegal tire dumping. Regulations meant extra costs for tire-related businesses, which in turn led to a booming business for illegal "tire jockeys" like the guy at the Havenhills' farm. To discourage illegal dumping, several states are experimenting with "amnesty days" for scrap tires.

A MONSTROUS FIRE HAZARD

If tires in landfills cause problems, their group behavior is worse. The hollow shape collects rainwater, attracting animals and mating mosquitoes. One Texas Department of Health inspector yarned that as the day warms on a Southern summer morning, clouds of the bloodsuckers can be seen rising from illegal dumps. It's close to the truth. Complaints of rampant bug breeding are often what tips off health inspectors.

Even when densely piled, tires

hold air, supplying enough oxygen to get a really good fire started and keep it going, turning any collected water instantly into steam. And what fuel to feed a fire with: The petrochemical contents of the average passenger tire equals about two and a half gallons of oil, with the energy potential of 15,000 Btu per pound, more than coal. Only about a third of each tire's oil is consumed in a fire, leaving behind the rest to seep into water supplies and aquifers.

The rank smell of unregulated burning tires can be attributed to sulphur dioxides; odorless but as polluting is nitrogen oxide, which comes down as acid rain. The carbon black used in the vulcanization of rubber for tires is the source of most of the dark particulates. Rounding out the fumes are benzene, whose effect ranges from severe headaches to cancer, and toluene, a liver- and kidney-damaging carcinogen.

Some spectacular tire fires have included the one in Winchester, Virginia, that lasted eight months, and a short (17-day) but devastating inferno in Ontario, Canada, which released more oil than was lost in the

Valdez spill. What remains after a tire fire is a toxic stew of waste oil, synthetic fibers, and metal wire, mixed with a variety of fire-fighting chemicals.



Even in these recycling times, retreads haven't found great popularity with the driving public.

END MARKETS: THE REAL SOLUTION

If somebody were out there *paying* for retired tires, as they're paying for discarded aluminum cans, the road to recycling wouldn't be littered with scrap tires. But with three billion backlogged, any company that makes products from scrap tires already has a constant oversupply of industrial feedstock. At the root, it's the same problem that plagues many recycling efforts: not enough demand for products made from recycled material.

Of the annual yield of trashed tires, according to the National Solid Wastes Management Association (NSWMA), five million, or two percent, are returned to the road as asphalt rubber pavement, a use that fortunately shows healthy growth. (See "Eco-Highways" on page 34.) Another promising but highly debated approach, incineration, takes 21 million, or nine percent; that percent will jump if the current vogue continues of using them as fuel for industrial boilers. Note that the heralded plethora of products that manufacturers have created from recycled rubber — mats, hoses, construction material, marine equipment — has used only five million tires, or two percent annually.

That leaves 193 million tires, 82 percent of them, to be landfilled, stockpiled, or illegally dumped each year. The latest approach to tire disposal is much like conventional integrated waste-management wisdom: reuse, recycle, incinerate — then landfill the rest. How to deal with the landfilled portion has provoked spirited tire-turf battles among rubber- and tire-trade associations and their members.

The Rubber Manufacturers Association's new Scrap Tire Management

Council is an attempt to mediate the fight. According to its wry leader Michael Blumenthal, "Our goal is to reduce the number of tires going to the landfill or to unmanaged stockpiles by 50 percent over the next five years. We do not support the landfilling of whole tires.... We think [illegal tire jockeys] should be apprehended ... and flogged."

Reducing the scrap-tire flow is a vital first step in an integrated approach. Fortunately, the tire industry has always reused their wares: ten million each year are used again as tires, and 34.5 million become retreads.

REUSE: RETREADING THE MILES

Somewhere along the road (literally), the myth arose that those black strips of peeled-off rubber were the exclusive product of retread tires. The myth forged their undeserved reputation for inferiority. Actually, those black marks come from both retreads and "virgin" tires, and the reason is the same for either: neglect. Improper inflation, imbalanced counterweights, and minor but unrepaired road damage all cause uneven wear that renders tire casings unsuitable for

retreading. The offhand manner with which most consumers treat tires means that about 90 percent of scrap passenger tires considered for retreading are rejected.

The bulk of the annual 34.5 million retread production (22 million) is destined for transport other than cars. Most likely, the tire for the landing and taxi gear on the last airplane you flew on was a retread. Trucks and off-road vehicles, such as bulldozers and tractors, take the rest. Some trade organizations such as the Tire Retread Information Bureau insist that, unlike passenger tires, truck tires are designed to be retread. Agreeing, Goodyear has an ad with a message reminiscent of that of the lonely Maytag repairman, stating that their trucks tires are so retreadable, "we could kick ourselves."

Because of manufacturing quality, tires that do survive driver abuse to become retread contenders — called casings by the retread industry — can be retread several times. But as domestic tire manufacturers developed better tires, they also designed ones that were more difficult to retread. "Because it's a more complicated manufacturing process to make the

original," explains Tony Hylton of the National Tire Dealers and Retreaders Association (NTDRA), "to retread it you'll need to use the same complex technology." An expensive, industry-wide changeover of equipment was required to deal with the design, and many retreaders simply stopped doing business. Before radials, 60 percent of tires were retread; now it's around 20 percent.

The telling blow to passenger retreads wasn't just tire style, but also buying habits. Even in these recycling times, retreads haven't found great popularity with the driving pub-

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lic. According to *Modern Tire Dealer Facts Directory 1991*, only 5.8 percent of passenger-tire sales were retreads. In Europe, that percent is more like 10 to 15%.

Retreads have a virtue most recycled products don't have: lower cost, from a third as much for a passenger tire to a quarter the price for industrial tires, with little to no loss in quality. If the general public feels it can afford to find retreads inferior, fleets find them a necessity. "The popularity of retread truck and industrial tires," says Hylton, "is because of the high price of radial truck tires. They have to be retreadable at least once or twice."

In these oil-sensitive times, retreads have another trait that may be their marketing coup: Retreading conserves about 75 percent of the oil used in manufacturing a new tire, upwards of 20 gallons in a truck tire. According to NTDRA, the 38 million retreads sold in 1989 saved 400 million gallons of oil.

★ RECYCLING: NOT A TIRE ANYMORE

At the immense 950-acre McCommas Bluff Landfill in Dallas, Texas, one tire every seven seconds is tossed onto a conveyer belt, spraying muddy water as it lands. Scrap tires are rarely clean and, stored out in the elements, never dry. Chugging up the conveyer belt, they topple over into a hopper containing super-sharp and precision-tooled shredding blades. Tumbling down another conveyer belt come strips roughly two inches wide and eight inches long that spread across acres like an artificial lava flow. A bulldozer pulls load after load from a tire pile rising 30 feet and stretching 100 yards — 350,000 tires. "It's a slow day," says field operations manager James Hallman, his crisp business suit and clean white car contrasting with the mudfest around him. "This is an eight-month backlog we're working on. Usually we can barely keep up with new deliveries." As the bulldozer revved up to take another bite out of the pile, a trailer full of scrap tires could be seen pulling up to the landfill gate. The backlog would have to wait again.

The average passenger radial by weight is 50 percent pure rubber polymer, nine and a half percent steel bead wire, and five percent synthetic fibers; truck and industrial tires have a greater percentage of



"Politically and functionally correct" according to the company, these bags were inner tubes. (Used Rubber USA; (415) 626-7855)

rubber. The remainder consists of chemicals used to vulcanize and strengthen tire rubber, including sulphur, carbon black, anti-oxidants, and a bundle of trace elements such as zinc oxide and aromatic oils (for which we should be grateful).

With few exceptions, an intact scrap tire is useless to manufacturers of recycled-rubber products (which eat up five million scrap tires a year) and energy-generating incinerators (which utilize over four times that much, at 21 million annually). These operations need raw resources or industrial feedstock derived by reducing scrap tires to their basic components. To separate and retrieve those substances, one way or another the tires have to be first cut into manageable pieces. This has led to a burgeoning new business of tire-mangling equipment, all of it expensive to buy and upkeep; those blades for McCommas Bluff's medium-size shredder must be replaced every two months to the tune of \$8,000. The power to run equipment is not cheap either.

Wheel poppers, de-rimmers, and crushers first remove sealed and pressurized rubber tires from their metal rims — dangerous, and an impressive show to see. Industrial shears, slicers, and cutters whack tires into pieces of all sizes. Shredders grind out crumb rubber, ranging from pulverized granules to the industry standard of two-inch cubes to irregular strips less than

a foot long, allowing the metal and fibers to be sorted out. Waste Management, Inc. has large mobile shredders cruising several states including Colorado, Florida, Minnesota, Pennsylvania, and Wisconsin, chewing up legal and illegal scrap-tire dumps at the rate of 1,000 tires an hour. Some of the tire shreds are used at WMI facilities as road base, construction fill, and landfill cover.

In Choctaw, Oklahoma, Safe Tire Disposal designed and built a fully automated system that can shred over 1,500 tires an hour, up to 10,000 a day, a cool two and a half million a year. Off to a racing start — a clawlike grabber moves scrap tires into the system, 25% faster than by usual bulldozer methods — tires move automatically through one shredder after another and finally through a circular sorter, until crumb rubber in uniform two-inch squares is produced.

Now no longer recognizable as tires, nor nearly such a fire hazard — chipped tires lay too densely to provide air to fuel the flames — the raw goods are ready to be incinerated or turned into anything from highways to hockey pucks. The rubber is essentially as good as new. But with millions of shredded tires warehoused at his Oklahoma sites waiting for a buyer, Safe Tire plant manager Gene Embry drawled sarcastically, "Hockey pucks is right!"

Marketing coup: Retreading conserves about 75 percent of the oil used in manufacturing a new tire.

Will recycling top 2%?

Fun though they are, tree swings and mower deflectors, rubber ties and sandals with tire-tread soles have limited consumer markets. Lately, manufacturers have located near-large quantities of tires to churn out items for industry. The Tire Pond company in North Haven, Connecticut, is next to an old brick-clay quarry that's now a 35-acre lake, home to 14 million tires with room for millions more; the company sells some to manufacturers, others for reuse, and stores the rest or sends them to be recycled into rubber mats by workers at the local Easter Seals-Goodwill Industries Rehabilitation Center. (Tires are practically benign, if not completely inert, under water. The Tire Pond lake has been tested yearly since 1977 for over 150 chemicals, with only minute changes in the water detected.)

In response to Oklahoma's new tire-disposal laws, among the toughest in the nation, Environmental Recycling set up shop in Eufala, Oklahoma, 60 miles from Safe Tire's mountain of crumb rubber, to make 100-percent recycled rubber mats and lumberlike posts.

Using crumb rubber, according to *Scrap Tires News'* special report "Scrap Tires in the '90s," plants are churning out industry decks and chic home-flooring tiles; roll-out mats for gymnasts and mats to wipe your feet on at the door. An elastic webbing produced with crumb rubber can be made into a fine net to anchor carpet fibers, or a thick mesh for hillside erosion control, or an epic-strength flexible gasket for use between floors of skyscrapers in earthquake zones.

The rubber chips themselves are used in

playgrounds as a safer substitute for gravel, to replace rock in gravel roads and septic-tank systems, and as mulch in places where appearance isn't a priority. Heat crumb rubber under compression, and you get resilient building blocks, from brick-size to one-ton bales. Other scrap tires go on the road as trailer bumpers, mud flaps for semi-trucks, and liners in pickup beds.

Cashing in on tires' durability and shape, inventor/businessman Jerry Goldberg came upon the keen idea of linking scrap tires together with thick, high-tensile cable to make Terramat. Prop it up vertically in a blasting area and you've got a safety shield that catches debris but lets air gusts through. Toss it in water and it's permanent fill; cable it to the shoreline for erosion control. Lay it on the ground and you've got insta-road for construction areas and accessing natural-disaster sites; fill it with gravel and the road is semi-permanent.

There's more. Stack up whole tires, fill them full of dirt, slap some adobe on the exposed treads, put a roof on top and you've got one heck of a well-insulated abode. Actor Dennis

Weaver's so-called Michelin Mansion in Ridgway, Colorado, used 3,000 tires. Near Taos, New Mexico, 50 houses using about 650 tires apiece are nestled into the Rocky Mountain foothills.

Aside from durability and bounce, rubber's other endearing trait is its imperviousness to water. Tie tires together and it's anchors away for floating breakwaters and artificial reefs; rubber in sea water becomes completely encrusted by mollusks and other filter-feeding crustaceans within a few weeks. Extra-large tires measuring six to eight feet in diameter, a size many shredders can't handle, are being cut in half to use as water troughs for farm animals. Push melted rubber through a tubular extruder for sub-surface irrigation systems and other hose products.

Compost to toxic sponge.

Resistant as they are to water, scrap tires soak up some other liquids. Dr. Wilhem Reindle of the University of Minnesota is experimenting with crumb rubber to absorb oil spills; oil can be pressed out and the rubber used again like a sponge. As reported in "Scrap Tires in the '90s," Dr. Robert

SCRAP TIRE INFOMANIA

For the ultimate overview on what to do with scrap tires, read the trade monthly *Scrap Tire News*, with manufacturing news, incineration advances, shredding equipment, scrap-tire legislation reports, and more; a year's subscription is business-priced at \$118. For tackling the scrap-tire crisis on a more individual basis, try STN's book *ReTired*, with over 50 home projects including making landscaping materials, tree swings, and playground equipment.

The \$12.95 price includes a special sabre saw blade designed to cut tires with home workshop tools.

Both publications are available from STN at P.O. Box 714, Suffield, CT 06078, or call (203) 668-5422.

American Retreaders Association
P.O. Box 17203
Louisville, KY 17203
(800) 426-8835

National Tire Dealers and Retreaders Association & NTDR News

1250 I St., NW, Suite 410
Washington, DC 20005
(202) 789-2300
(800) 87-NTDRA

Rubber Manufacturers Association Scrap Tire Management Council
Washington, DC
(202) 682-4800

Tire Retread Information Bureau
26555 Carmel Rancho
Boulevard, Suite 3,
Dept. 990
Carmel, CA 93923
(202) 625-3247

HISTORY OF RUBBER & TIRES

While cruising the Caribbean in the 1490s, Christopher Columbus saw Haitian natives playing with a bouncing ball they'd made from oozing sap. By 1615, South and Central American Indians had learned to make cuts in the bark of *Hevea* and other tropical trees to extract quantities of the milky, white latex. It was brushed on cloaks to create the original rainwear, and poured into crude molds to make rubber bottles and galoshes. But still no rubber wheels.

Synder of Tire Technology Inc. in Michigan, a former research director for Uniroyal (now Uniroyal-Goodrich), is researching crumb rubber as an absorbent for hazardous or toxic waste, which can soak up to its own weight in hydrocarbon liquids and gases, polychlorinated biphenyls (PCBs), printer's ink, hydrocarbon sludges, and other oily wastes.

Then there's always turning scrap tires into compost. This new field, still in the experimental stages at the U.S. Dept. of Agriculture labs in Maryland and New Hampshire, involves replacing wood chips with rubber bits in the composting of municipal sewage sludge. Though the composted end product would undoubtedly withstand a lot of foot traffic, it's aesthetically unpleasant stuff, usually banished to low-pedestrian areas such as highway right-of-ways. The composting process could, supporters say, quickly use up the backlog of tires. This begs the question of what's to happen to all those wood chips, also unwanted at landfills.

On a more conventional note, the U.S. Dept. of Energy is conducting experiments into modifying scrap rubber so that plastic can be bonded to it. When mixed with polyurethane, the main plastic for forklift tires, it yields a substance that doesn't slip, even on wet, polished concrete. With just 10,000 Btu per pound needed for production of modified rubber, compared to 80,000 Btu for virgin polyurethane, a lot of energy could be saved. A drawback: the hybrid end result is a problem to recycle.

INCINERATION: A SHORT-TERM NECESSITY?

Each tire has energy potential. It takes 20 gallons of oil to make the synthetic rubber in a truck tire, about half of the tire's total rubber content. An average-size passenger tire contains about 15,000 Btu per pound; compare that to

coal's typical 10,000 Btu per pound. But rubber's energy value doesn't come without costs: scrap tires are bulky and costly to transport even when shredded, and burning petrochemical-based material as fuel means expensive pollution controls.

Put through a thermal extraction process called pyrolysis, a passenger tire will yield, in addition to carbon black, one gallon of burner-quality oil and 450 cubic feet of propane gas, easily enough to heat a home for a day. The problem is profit. With its extensive pollution-prevention and safety equipment, pyrolysis will be a money loser until oil prices top \$50 a barrel. Pollution by sulphur dioxides released during the process is another nagging issue.

More cost-effective, for now, than pyrolysis is simply burning tires for steam and gases to spin electrical turbines. The Oxford Energy Company's first plant in Westley, California, burns four and a half million tires yearly to generate 14 megawatts of electricity for some 15,000 homes. Located near the largest scrap-tire dump in the world (42 million tires or more), saving money on transport, the facility uses an unusual, money-saving approach, feeding tires whole into 2000-degree-Fahrenheit boilers.

For 200 years, rubber's potential remained untapped. Well, not untapped, but unrealized. Exasperating to manipulate, rubber needed solvents to make it more workable, and turpentine and ether didn't come cheap in those days.

Around 1820, Scottish chemist Charles Macintosh thought of using an industry standard, coal-tar naphtha, as a solvent for rubber. What came out of Macintosh's experiments was a rubber that would combine effectively with fabric; that's why some raincoats are called "mackintoshes." His colleague Thomas Hancock came upon ways to heat-meld rubber for manufacture. Now, tires were a possibility.

Still, the wonder stuff was a mess: It expanded when hot, contracted when cold, and was too tacky for most purposes except the one from which it got its common name: erasing pencil marks. Even worse, it smelled really bad, and disintegrated too quickly. Charles Goodyear changed all that in 1839 with the invention of vulcanization — blending rubber, lead, and sulphur with heat. This rubber was durable and consistent, if still a bit odorous, and perfect for tires.

The idea for an air-filled tire was patented as early as 1845, but went nowhere, beat out by solid-rubber tires. In 1888 an Irish chap named John Boyd Dunlop, a veterinary surgeon by trade, patented a design for pneumatic bicycle tires — inner tubes filled with compressed air and then set in a protective rubber casing — in his search for a gentler ride. Dunlop was no casual cyclist, and soon after his patent no longer a vet.

Bicycling beat walking to work for late-19th-century commuters,

Using technology purchased from the West German firm of Gummi-Mayer, to which Oxford has the exclusive North American rights, the boiler's temperature is computer monitored to achieve the cleanest burn; extensive scrubbing systems control airborne pollution and odors. Melted-away steel is retrieved for recycling, zinc from the fly ash is recovered for re-smelting, and the lime slurry used in scrubbing is recycled for its gypsum (calcium sulfate) content. Passing even California's strict air-quality standards, Oxford plans future plants for Lackawanna, New York, and Sterling, Connecticut.

But according to Michael Kennedy, manager of Tire and Fuel programs for

CONT. ON P.35

Waste Management-North America, most of the 21 million tires burned are used in cement kilns and pulp and paper industry boilers as tire-derived fuel (TDF), another way of saying crumb rubber destined for incineration.

Crumb rubber is considered a lump fuel, and most boilers can only use a minority percentage of lump fuel. A few electricity generators, including the Illinois Power Company, are also experimenting with TDF. Sometimes the tire-to-energy cycle almost fits the definition of closed-loop: Scrap tires are burned for fuel at Firestone's tire-production plants and at a major retread factory in the Midwest.

Proponents of TDF stress the lower levels of sulphur dioxides and nitrogen oxides released by burning scrap tires compared to coal, and the necessity of trimming the backlog of three billion scrap tires.

Opponents such as the National Toxics Campaign maintain that the massive boilers cannot be monitored properly to control pollution, that blending fuels can lead to new and possibly hazardous compounds being formed during burning, and that unscrupulous industries could conceivably hide toxic wastes by soaking scrap tires in them prior to incineration.

Michael Blumenthal of RMA's Scrap Tire Management Council concludes, "Incineration is not the ultimate answer; it's an interim answer. As other markets for scrap tires increase, the economics of incineration won't hold out."

★ THE FUTURE: LOOKING FOR BLACK GOLD

The future of scrap-tire recycling hinges on one thing: the price of oil. The low cost of crude drives intense competition among virgin-rubber producers, keeping prices down and

Tirec Systems promises 100% recycling of scrap tires: After granulation, steel particles and polyester fiber are separated from the rubber, and sold as raw materials.

recycled rubber products out of the picture. But with three billion-with-a-b tires and counting, a more pro-active approach seems needed. States including Florida and New York require the use of asphalt rubber on public roads. Retreads are picking up in popularity, especially with the government. The Environmental Protection Agency finalized guidelines requiring the General Services Administration to approve retreads for inclusion on the federal government's Qualified Products List, opening up a market for millions of casings, especially in the passenger-car division for government employee fleets (meaning big savings for taxpayers). And most states that imposed tire-disposal fees are setting aside some money to research tire recycling.

If there weren't so many darn tires in the first place, the disposal problem wouldn't be as immense. Extending tire road life, buying long-lasting tire brands, using mass transportation, are all actions each tire consumer can take. But the number of tires annually bought — and discarded — won't be substantially reduced as long as we're a car-dependent society.

Amy Martin, a Dallas-based science and environmental writer, has a column entitled "Talking Texas Trash," syndicated throughout the state.



ECO-HIGHWAYS:

Where the Rubber Meets the Road

The next great black hope on the horizon is asphalt rubber (AR)* paving, which consumes five million scrap tires a year. Up to 16,000 tires find their karma in every mile of a three-inch-deep, two-lane paving. In rubber-modified asphalt concrete, sometimes called dry-process AR, crumb rubber replaces some of the stone, sand, or aggregate used in conventional paving mixtures. The coarse material is mixed at the paving site with hot asphalt, a dark and tacky substance which, like rubber, can be both naturally derived or a petroleum by-product. Laid out as pavement, AR paving hardens as it cools. The number of tires used per mile depends on the pavement thickness. Off-road, AR is used for running tracks and airport runways.

AR's virtues are easy to extoll. It's more elastic than conventional asphalt so it cracks less and lasts up to three times longer. The

• Editorial note: NSWMA calls it rubber asphalt; NTDRA calls it rubber-modified asphalt; FHA calls it crumb-rubber asphalt. The Asphalt Rubber Trade Group calls it asphalt rubber, and so will we.



and it was cheaper than taking a street car. Machinery driven by steam and electric power increased demand for rubber, as did the rise of automobiles in the early 1900s. French rubber manufacturer Michelin & Cie transferred pneumatic technology to cars' bigger wheels. Switching farm tractors to rubber wheels (from steel) further upped the ante. Sales took off; by the 1960s, when radials took over and retreading plummeted, the scrap-tire situation was becoming a crisis.

British territories in Ceylon (now Sri Lanka) and Southeast Asia became the scene for a huge rubber-plantation industry, using seeds of the *Hevea brasiliensis* species collected in South America in the mid 1800s. American industry ran on rubber collected drop by drop across the globe and imported, often from unfriendly and unstable countries. (Sound familiar?) When Japan conquered Southeast Asia in the early '40s, the United States' major rubber source was cut off.

In the meantime, Germany and the Soviet Union had figured out how to make synthetic rubber from petrochemicals. American industry responded with their own synthetic version within a year. Like pre-vulcanized natural rubber, synthetic rubber had its ups and downs, but by the 1950s the two were about equal in popularity. A variety of synthetic rubbers was developed, each with its own peculiar qualities: Silicone rubber withstands high temperatures, acrylonitrile resists oil, and butyl rubber is less affected by air.

In many ways, natural rubber has better elasticity, resilience, and tack than synthetic. Because of its tendency not to build up temperatures, natural rubber is essential where overheating could cause tire failure.

Passenger tires are 55 percent synthetic and 45 percent natural.

Tire technology developed through companies whose names are a whole new ball game with little margin for error. rubber's hit parade, including Dunlop, Goodyear, and Michelin. By the 1950s, tubeless puncture-sealing tires of industrial fabrics and rubber bonded to a metal rim were standard. From there the modern car tire was perfected, from bias ply to belted bias to the steel-belted radial, popularized in the United States during the '60s after earlier acceptance in Europe.

The development of plastic siphoned off many of rubber's previous markets.

Now rubber's main uses are tires — over half of all rubber sold — and shoes.

— A.M.

surface is highly textured, tending to furrow away rather than puddle water, making AR safer to drive on than concrete, glassphalt, or conventional asphalt. AR can be mixed in warmer outside temperatures than conventional asphalt, extending the season and weather conditions under which roads can be built and repaired. It's also 50 to 80 percent quieter to drive on, reducing the costs of noise-abatement structures along highways in populated areas.

The northern states experimenting with it — Massachusetts, New Jersey, New York, Minnesota, and Washington — are hearing raves from drivers for its ice-resisting abilities, especially on bridges. That's an unexpected plus for a product first developed in Arizona, and a bonus for the environment because AR won't need as much rock salt for de-icing. For the past several years, asphalt rubber has been used on Interstate 80 through the legendary 7000-foot-high Donner Pass in the Sierra Nevada of California.

More roads are being repaired than new roads being constructed, so in greater demand than plain AR is asphalt-rubber binder, which has a solid track record as a cure for cracking in conventional asphalt pavement caused by fatigue, weather — everything but earthquakes. Since 1983, the Texas Highway Department has used this mix as a stress-absorbing membrane and interlayer in 3,700 lane miles of conventional paving (at the rate of 1,000 tires per mile). While applying conventional asphalt pavement is a complicated-enough process, applying hot conventional asphalt binder is a cross between science and art, an exceedingly complex sequence of chemical reactions involving viscosity, elasticity, and granular structure. Now add the crumb-rubber variable and you've got

Even so, why isn't this stuff on every highway? "Naturally there's resistance to anything new that requires learning something new," says Gary L. Cooper of the Asphalt Rubber Producers Group (ARPG), alluding to the aforementioned AR peccadillos. Plus, he adds, "It's an improved product, not a miracle product. The place it's used has to be engineered as well as the product." In other words, it won't make a bad road better, as was once claimed. Although AR for roads has been bouncing around since the early 1900s, it didn't hit its stride until the '60s. At that time, according to Cooper, original promoter/developers of AR were a little "overly enthusiastic about the product," oversold its virtues, minimized its drawbacks, and didn't adequately train paving contractors in AR's more complex application. That hype gave AR a widespread (and deserved) initial reputation for inferiority.

The role of the ARPG over the past 20 years, according to Cooper, has been to simultaneously develop efficient, cost-effective technology and equipment for AR production and application; educate appliers of conventional asphalt in AR technique;

rehabilitate AR's shady reputation; and take on the vigorous and influential conventional-asphalt lobby. The AR drawback most touted by competitors is its expense, 30 to 50 percent more costly to prepare and apply than conventional asphalt. Cooper points out that "those figures are based on municipalities laying AR in small sections of roads as experiments, a situation where any cost would be higher." He cites a California highway-paving project that determined that, because of its added bounce, one inch of AR could replace two inches of conventional asphalt, bringing costs to a rough equal.

The NTDR, ARA, Rubber Manufacturers Association, Tread

Rubber Manufacturers' Group, and the Private Brand Tire Group drafted a joint action encouraging the Federal Highway Administration to issue standards for asphalt-rubber pavement to foster its marketability. The FHA concurred. Douglas Bernard, chief of FHA's Demonstration Projects Division, testified before a U.S. Senate Subcommittee on Energy Regulation and Conservation that if AR could "demonstrate cost-effective performance, then crumb-rubber asphalt could become a significant alternative use for waste tires."

Asphalt rubber isn't the only way for highways to help the environment. Highway departments are immense



COURTESY TIREC, INC.

Scrap tires unsuitable for re-treading are granulated, and different parts separated.

purchasing entities and can be a pivotal player in recycled-material markets. The Texas Department of Highways is the largest builder of roads in the United States, if not the world. The Lone Star chapter of the Sierra Club has asked that the department create an environmental advisory committee to explore highway-related eco-matters.

Plastic: Working with Du Pont Company and Waste Management, Inc., the state of Illinois is identifying highway construction and maintenance projects that could use recycled plastic. One of the first products, manufactured by WLI Industries, is the SafetyCade three-

piece collapsible highway barricade. Made from recycled HDPE, the plastic is refined at the Chicago facility of the Plastic Recycling Alliance, a joint venture of WMI and Du Pont.

Also under consideration is the use of plastic lumber instead of wooden posts to erect barriers, and instead of concrete for bollards. Plastic lumber is termite- and water-proof, making it particularly good for remote and frequently flooded areas; it's lighter in weight, saving on shipping costs and the manpower need to install it; and it's tinted so it never needs painting and graffiti washes off.

Mulch: Mulching highway right-of-way plantings is often more than just beautification; plantings prevent erosion. In these times of water conservation, the California Department of Transportation uses mulches from wood chips, but someday the chips will be composted with municipal solid waste. A few places use a mulch of chipped tires. Organic material in mulches is absorbed into the soil so that it retains water much more effectively.

Paving: Highway paving made from concrete can be recycled simply by crushing it back into small rubble and mixing it again with liquid. The problem, as with scrap-tire crumb rubber, is removing the metal. Concrete from the double-deck Embarcadero bridge, a victim of California's last major earthquake, which is finally being demolished, will be crushed and reused in the construction of the new bridge.

Conventional asphalt paving can also be recycled, but the technology has so far lagged. Cyclean Inc. is working with the cities of Austin, Texas, and Los Angeles, and with the Army Corp of Engineers at Army airfields, to recycle asphalt. Using microwave energy, old asphalt is scraped up, rejuvenated, and laid back down in one operation. The machinery surpasses California clean-air standards. Carl Hutchinson of Cyclean estimates that 100 million tons of asphalt is landfilled each year. Cyclean is contracted to provide Los Angeles with 120,000 tons of recycled asphalt annually.

As for asphalt-rubber paving, which is just 20 years into its existence, none of it has degraded enough to need to be recycled. —A.M.



DOING YOUR PART:

How to Make Tires Last

BUY RETREADS: In 1989, car and truck retreads saved 400 million gallons of oil. Retail establishments that sell recaps usually cater to the truck and trailer crowd, but passenger retreads are available. Look for these establishments in the Yellow Pages under headings such as "tires — used," or tire recapping, retreading, and repairing.

Many of these places will accept your old tires for recapping; sometimes you can even get the originals back retreaded. To make sure your tires can be recap candidates, keep them in good shape and turn them in before the tread gets down to one-sixteenth of an inch. Though difficult to retread, radials make superior recaps because the tire withstands general wear better than bias.

For a free copy of the "Directory of Scrap Tire Processors," write to the Rubber Manufacturers Association, 1400 K St., NW, Washington, DC 20005 or call (202) 682-4800. For an overview, "Scrap Tires ... Understanding the Challenge," write to the Public Information Dept., Goodyear Tire & Rubber, 1144 E. Market St., Akron, OH 44316 or call (216) 796-2121.

Most major tire retail chains including Goodyear, Michelin, and Uniroyal-Goodrich sell retreads, but only for trucks and industrial vehicles. Michelin issues credits to buyers of their new commercial tires, which can be applied toward the cost of retreading Michelin casings. *Scrap Tire News* gave the company a "High Performance Award" for the program last year.

Sears catalog offers Achievor® re-manufactured radial passenger-car and light-truck tires, and radial and non-radial generic retreads. Call (800) 366-3000 to order a copy of the automotive specialty catalog. Or purchase Achievors® and other retreads directly through Lakin General Corporation factory; call (800) 545-8563.

Take things one step further and request that companies and state and government departments use retreads. Most airlines and large taxi fleets run on recaps. Corporations using retreads include Federal Express and United Parcel Service.

For a free brochure on the economic and environmental benefits of retreads, send a self-addressed stamped envelope to Tire Retread Information Bureau, 26555 Carmel Rancho Boulevard, Suite 3, Dept. 990, Carmel, CA 93923.

BUY LONGER-LASTING TIRES:

Some tires live longer than others. Look for tires with higher tread-wear ratings, but remember that actual tire life depends on more than tread-wear ratings.

For a pamphlet listing the traction, temperature, and tread-wear ratings for all domestic and imported tires, call the National Highway Traffic Safety Administration's auto-safety hotline at (800) 424-9393, or write to Distribution Center M443.2, National Highway Traffic Safety Administration, 400 7th

Street, NW, Washington, DC 20590.

The Center for Auto Safety has ranked 150 popular tires; write to them at 2001 S St., NW, Suite 410, Washington, DC 20009.

BUY LESS-POLLUTING TIRES:

The harder ride you get from radials pays off in less rolling resistance, which in turns leads to greater fuel efficiency for your car and less air pollutants released.

SEE YOUR TIRES TO THE END:

Whether you're buying retreads or regular, purchase only from stores that have responsible scrap-tire-disposal policies for the used tires turned in. Most states require guaranteed safe disposal of scrap tires, but sometimes those regulations apply only to larger dealers. Most of the national chains have corporate policies on legal disposal.

If somehow you do end up with worn tires you don't want — there are a few places where a trade-in on your old tires means they end up in your trunk — be aware that many residential garbage collectors won't pick them up. Resist the urge to toss them in the nearest dumpster. Call your sanitation department and ask about scrap tires; most municipal landfills and transfer stations will accept a limited number of tires from residents without charge or at a low fee. Occasionally recycling centers will as well.

TLC FOR LONGEVITY: Most passenger tires hit the scrap pile 40,000 miles shy of their intended lifespan of 80,000 to 100,000 miles, mostly due to driver neglect. That means we throw away twice as many tires as we need to. A well-maintained tire is also easier to retread.

If all tires were properly inflated — half on the road are under-inflated — two billion gallons of fuel could be saved a year. The suggested air pressure is embossed on each tire's sidewall; increase pressure slightly for extended highway driving. Carry a pen-sized air-pressure gauge in the glove compartment and check pressure while tires are cold.

Rotate and balance tires every 6,000 to 8,000 miles; check the sidewall to see what direction the tires should point. Use uniform and firm inflation; an under-inflated tire creates drag or rolling resistance, is less energy efficient, and leads to greater cumulative emissions. Keep your car's alignment balanced, and brakes in good shape.

Check for road damage frequently and repair promptly. Stand up for tire rights by lobbying your municipality for greater pot-hole maintenance.

For a glove-compartment-size, tire-safety and mileage kit including air-pressure gauge, tread-depth gauge, four tire-valve caps, and a hefty *Consumer Tire Guide*, send \$4 to the Tire Industry Safety Council, P.O. Box 1801, Washington, DC 20013.

Call your local Better Business Bureau and ask for *Tips on Tires*, part of the BBB's Consumer Information Series. It includes suggestions on tire rotation and alignment, purchasing and warranty tips, and an excellent guide to reading all those numbers and letters and symbols embossed on a tire's sidewall. Or write the Council of Better Business Bureaus, 1515 Wilson Blvd., Arlington, VA 22209.

Another guide, oriented toward high-performance tires, *Tire Tips* is available from Bridgestone by calling (800) TIRE-BSA.



"Tring It" and you can mow around it, promises Port Industries, which uses waste-tire parts for its rubber tree rings.

Around my home town, "dump-picker" was about the meanest name we kids could think of to call each other. Paradoxically, one of my favorite grown-ups was Carol E. Gray, a crusty gentleman with an endless supply of tall tales and a front yard that was a maze of stoves, washers, car parts, tires, old farm implements, and furniture. Mr. Gray brought all these things home from the dump, fixed them up, and sold them to people who couldn't afford to be finicky.

Like so many others, our town dump was located in a swampy area, where its leachate is proba-

ble to lease on life. If you want to be a dump picker these days, you've got to beat the garbage truck.

But then, who's hankering to be a dump picker? Let's face it: We've got a hangup about owning something that's already been owned. Even being spotted with a fistful of clothing at the Goodwill store sends a gush of blood to our cheeks. Poor people shop at Goodwill, the perception goes, and "poor" is the *last* four-letter word we want to be called.

Well, it's all in the name. Rechristen the Goodwill the "Chic Antique Boutique," and business will boom. In the same vein, wander down to the community swap meet in search of a \$4 radio, and suddenly, you don't feel like a dump-picker at all!



PHOTOS BY PAUL AIKEN

SNATCHING DISCARDS SAVES ENERGY, RESOURCES, AND LANDFILL SPACE. AND LOTS OF MONEY.

bly still fouling the water. Particles of its grubby smoke probably still colonize the lungs of nearby residents. If that dump isn't closed by now, it should be.

Unfortunately, as dumps like this one close, the Carol E. Grays of the world lose access to the tons and tons of perfectly good, money- and resource-saving items that their neighbors prematurely throw away. Increasingly, garbage is kept under lock and key, with no chance for a second

DUMP PICKING FOR BEGINNERS



SAFETY IN NUMBERS

Poking through other people's discards can be a lonely sport for the individual.

"People won't look at you," says Daniel Cross, a Flagstaff, Ariz., graduate student who's found everything, from new clothing to furniture to a change jar holding \$37.92, in the dumpsters outside the Northern Arizona University dormitories. "It's as though they're afraid of you. As though you must be from a different segment of society."

For those who lack the nerve to scour sidewalks and dumpsters in broad daylight, there may be a place in your community where you'll be just another face in the crowd of environmentally aware swappers.

For instance, when the Central Vermont Planning District sponsors an old-paint drop-off day, they make room for a paint-swap table. You bring your half-gallon of interior orange. A paint expert examines it for hazardous ingredients, and directs it either to a disposal barrel or to the

Tom and Rosemary Smith dive deep into a Virginia dumpster - and surface with garbage gold.

"I'M NOT USING IT ANYMORE, BUT LET'S NOT LET IT GO TO WASTE."

—Marchelle Duranleau Wolf, whose rabbit hutch came from the Freebie Corner neighbors maintain near an intersection.

reuse table. There, you may score a partial can of exterior purple — just enough to paint the dog house. It's yours, free of dirty looks. Since its state-assisted pilot drop-and-swap in the fall of 1989, the District has hosted a second event, helping, in all, 1,500 gallons change hands. And it has avoided paying at least \$5,500 in disposal fees. Eight of the state's 12 solid-waste districts have followed suit; the other four have drop-and-swaps planned.

Sidewalk swaps are another place to redistribute your leftovers. The Freebie Corner in South Laguna Beach, Calif., is just such a spot. When Marchelle Duranleau Wolf and her husband moved to the neighborhood two years ago, they noticed the neat, wooden "Freebie Corner" sign that someone had added to a lamp post at an intersection. Beneath the sign, at the side of the road (there are no sidewalks), was a small collection of household and yard items. Since then, the Freebie Corner has furnished Ms. Duranleau Wolf with a rabbit hutch, and she has furnished it with a hassock. (The hassock, however, had a hard time being adopted — over the

weeks, she watched it turn up again and again.) The Corner is in the middle of the neighborhood, in view of a couple of houses. It is always neat and the participants make sure there is never too much stuff there.

"There's an unspoken [rule] that there shouldn't be a lot of stuff there," she says. And no one is ashamed to pick up goods from the Corner. "It's all in the spirit of 'I'm not using it anymore, but let's not let it go to waste. If someone else can use it — great.'"

The idea of "shopping" on the sidewalk isn't only a West Coast phenomenon. The day my pal and I rented our Brooklyn apartment, we rescued from the curb a pretty little hutch with etched-glass doors. As we prepared to leave Brooklyn recently, we put out two chairs, a burned-out TV, an old piece of broadcast-testing equipment, and a bag of clothes. All disappeared within the hour. And in cities where the sanitation department takes "big junk" only once or twice a year, swappers literally race the

garbage trucks to rescue the gems from the sidewalk.

Perhaps the most out-of-the-closet dump-picking program makes its home in Wellesley, Mass. The recycling drop-off in this small city offers far more than the standard bins for glass, paper, and steel. There is a "swap shop" board where Wellesleyites can *advertise* their unwanted couch, fertilizer, or paint. There's a book exchange. And there's also a "take it or leave it" area, where superintendent George Barry says he's seen people leave (and take) just about everything, including a kayak and small rowboat. One woman even asked if she could leave her old Volkswagen there. By sanctioning the reuse of goods, the town achieves a 28-percent recycling rate, overall, and gives dump-picking a good name. In Wellesley, being caught *taking* goods from the bustling recycling depot is nothing to blush about.

DUMPSTER DIVING

Dumpster diving is not for those who are vulnerable to smirks and sneers. "We've been taught that we've got to buy, consume, and throw away; buy, consume, and throw away," says Edmund B. Fitzgerald, dumpster diver. "We come to think that somebody who doesn't do that isn't a full member of society."

Mr. Fitzgerald is the editor of *NAD-DUM News* — the newsletter of the National Association of Dumpster Divers and Urban Miners. A veteran scrounger, he's gotten his share of strange looks, which are usually transformed, he says, when he pulls forth a good appliance or piece of furniture. "They realize, 'Hey! He's got something really nice! And he didn't pay anything for it!'"

With town dumps closing fast,

Curbside pickup: In cities, divers scramble to keep ahead of garbage trucks.



dumpsters present an excellent opportunity to salvage good stuff, according to *NADDUM News*. Each issue offers numerous success stories, as well as advice on dumpster etiquette, such as: Always ask permission before you dive into a company's dumpster. If somebody's working a claim when you arrive, wait your turn. And carry, for credibility and quick assessment of treasures, a copy of *Schroeder's Antiques Price Guide*.

Dumpster diving can be lucrative. A recent *NADDUM* story profiles a diver in Maryland, who reported scoring a stereo, cassette deck, speakers, two radios, a computer terminal, tape drive, and printer, a cable-TV converter, and a printing calculator, within the space of a month.

Another success story, from Virginia, got its start when the "Smith" family's real-estate investments collapsed, followed shortly by the washing machine. In desperation, the Smiths (through anonymity, they hope to avoid zoning-board persecution) dismantled their washer, finding a small toy lodged in the water pump. Acting on a hunch, they subsequently discovered that half the washers peo-



ple throw away have very little wrong with them. A new business was born. In five months, the family rescued 50 repairable washers and dryers from the curbside and resold them. (Since the recession set in, appliances are turning up less frequently.)

In the process, Rosemary Smith has become a dumpster junkie, to the chagrin of her daughters. The family cruises the wealthy side of town, scoring a steady stream of washers and dryers, as well as a nearly new lawn mower, a wrought-iron patio set, and an antique bed, inlaid with ebony, cedar, and cherry floral patterns. She

The Smiths score skates and books that were destined for the dump.

chuckles, "We're the 'poor trash' of the neighborhood, but it's been really beneficial. I've made so much money off this one guy, I feel like I should write him a check." Her daughters forbid her to stop in front of classmates' homes, and her husband draws the line at opening garbage cans. But she's hooked. "It's like yard-saling," she says. "Some Sunday nights, when I can't be everywhere at once, I think, 'What am I missing? What's going to the dump?' I wish I could get one of those satellites to take pictures of every neighborhood, so we'd know where to go."

Dan Cross, the Flagstaff graduate student, echoes this sentiment. "You know you don't need anything, but there's an excitement about it," he says. "It's like people who go to antiques sales or auctions." He checks regularly on dumpsters behind the Goodwill, a grocery store, and a gen-

CORPORATE DUMPSTER RAIDERS

Businesses harbor no fine feelings about raiding a dumpster (figuratively, at least) now and then, since it has proven to be a sound financial strategy. Across the country, newsletters, swapsheets, and helpful organizations are popping up to assist businesses in using up each other's waste.

One of the most energetic of such programs was born to a strange pair of bedfellows in Iowa. One parent was the "Try Iowa" program, through which agents travel the state pressing businesses to buy their raw materials from in-state suppliers. They were hearing pleas for another kind of assistance — help us get rid of stuff. The other parent, the Iowa Waste Reduction Center, was interested in doing just that.

Now, when Try Iowa agents from three of Iowa's 16 Regional Economic Development Centers call on business owners, they make an analysis of the company rubbish heap. The type of waste products, with the annual volume, are noted. Back at the office, the staffers work the phone, calling every company that they think might have a use for things like 26,000 pounds of feed bags, 520

pounds of aluminum printing plates, or 600,000 pounds of egg shells. Every three months, a list of such goodies, garnered by the three districts and the statewide Iowa Waste Reduction Center, is sent out to 1,300 businesses.

One recent match involved a pallet rebuilder and a hydraulic nail-gun maker. The pallet rebuilder was cobbling together old pallets, and accumulating a mountain of scrap wood. To test their nail-guns, that manufacturer was buying new 2-by-4s, filling them full of nails, and sending them to the landfill. Through the waste exchange, the nail-gun maker got those scraps for free, and shot them up. The pallet rebuilder burned the wood and sold the reclaimed nails as scrap.

Another match should put those tons of eggshells to use. "I got them together with a fertilizer company," says Gary Dill, one of the state's garbage cupids. "They're setting up to land-spread the eggshells, 'cause they're 96 percent calcium chloride — lime."

If your business is ready to diversify into dump-picking, see *Resources*, following page, for a list of swap programs.

"PEOPLE WON'T LOOK AT YOU. IT'S AS THOUGH THEY ARE AFRAID OF YOU."

— Daniel Cross, a Flagstaff, Ariz., graduate student, on the reaction of people who spot him mining his university's dumpsters.

eral store (where one day a woman saw him salvaging screwdrivers and pressed \$4 into his hand, telling him to get something to eat).

At the university, the end of the semester always finds dormitory dumpsters overflowing with furniture, clothes, books, notebooks, appliances, even full bottles of shampoo. Anticipating this bounty, Mr. Cross is torn. He's assistant-teaching now, and he worries about his students seeing him reclaim their discarded clothes and hairdryers. He says doubtfully, "I believe in what I'm doing, so I guess I've got to ignore that."

If dumpster diving sounds like your kind of shopping, prepare for a lot of tinkering. Furniture usually needs refinishing or painting. And most people don't throw out a radio, washing machine, or computer unless there's something, however minor, wrong with it. Although you'll usually need to do some troubleshooting and minor manipulation, sometimes all a cranky appliance requires is a brisk "service tap."

Also, keep your eyes peeled for tools of the trade. (A real dumpster diver would "scrounge" or make them.) First among them is a long pole, like a broom handle or hockey stick, with a hook or bent nail on one end. If you don't want to actually enter a dumpster, make your pole sturdy enough to pull out furniture. Heavy gloves are essential. Shoes with nail-resistant soles are advisable. And if you're going to dive in, the tougher your clothes, the better.

GETTING RID OF STUFF

If your community isn't interested in a regular junk-swap, then tag sales, thrift stores, and rummage sales are good options when it comes time to get rid of some of your stuff.

• **Tag sales** can be thrown at a moment's notice, or as a cooperative wing-ding with a half-dozen friends and neighbors. The cooperative route definitely makes the day pass faster, spreads the burden, and complicates the finances. (The crowd of people on your lawn also helps create the illusion that your junk is fabulous.)

Follow these important tag-sale rules, and your event is guaranteed to be a success:

* **Make signs that are clear at a distance** — a ten-car pile-up in front of your sign will detract from the message.

* **Put your junk out clean, and have an extension cord handy to prove that your Elvis lamp works.**

* **Be cheap.** Remember, the idea is to pass the stuff along, not to get rich.

* **Call it quits early and replace your signs with new ones that read "Free Stuff."**

• **Thrift stores** often will take things on consignment. When you drop off your John Denver albums and your extra chest-of-drawers, your name goes on the price tag. When (well, if) someone buys the items, you get a cut. Call and ask about the consignment policy before you lug your treasures to a store. Make sure everything is clean when you drop it off. (Your state may have

a policy on mattresses, which can spread diseases. Most Goodwills don't accept them.)

If you don't want to hang around for the money, there are numerous organizations that will be delighted to receive your donated goods (see *Where to Take It*). Some even take ugly, broken junk, and turn it into clean, useful merchandise. The giants of the thrift-store world are Goodwill and the Salvation Army.

Some 300 million dollars, or one-half of the money Goodwill uses to fund its job programs, comes from its donated-goods program. In 1989, people brought 569 million pounds of clothing, furniture, and appliances to the 1,200 Goodwill stores and other drop-off sites. That's 284,500 tons of stuff that not only avoided the landfill, but also got a second round of use. Of the items that don't sell, or that Goodwill's disabled clients can't fix, some are thrown out, while others are sold in bulk to salvagers or overseas markets.

The Salvation Army is in the same business, with its social concern the

WHERE TO TAKE IT ... AND RESOURCES

Goodwill and the Salvation Army aren't the only places that need your discards — in fact, they sometimes get more than they can handle. If you're trying to get rid of something with a little life left in it, try the suggestions below. Consult your Yellow Pages to find the organizations in your area. Don't assume local organizations want the stuff — call first.

Appliances, large and small:

Schools*, thrift stores

Art supplies: Children's centers, schools, theater and dance centers

Auto batteries: Auto-parts stores

Books: Children's centers, day-care centers, libraries, schools, thrift

stores, used-book stores

Cloth: Children's centers, learning centers, theater and dance centers

Clothes hangers: Dry cleaners

Clothing: Schools, shelters†, thrift stores, theater and dance centers

Furniture: Shelters, theater and dance centers, thrift stores

Homemaking stuff: Schools, shelters, thrift stores

Magazines: Children's centers, libraries, schools

Metals: Look in your Yellow Pages for recyclers, scrap dealers, or salvagers

Office equipment: Arts centers and organizations, non-profit organizations, schools, shelters

* Schools include, as appropriate, centers for the blind or hearing impaired, grade and high schools, Head Start programs, music schools, nursery schools, universities, and vocational schools.

† Shelters include family shelters, homeless shelters, teenage-runaway agencies, women's shelters, etc.


rehabilitation of people with alcohol or drug problems. Its 1,363 thrift stores sell clothing, furniture, and household goods which are mended by clients. The Salvation Army doesn't keep track of how much stuff is dropped in the thousands of donation boxes found in parking lots nationwide.

• **Rummage sales** are generally thrown by a church or a charity, in order to raise money. Their offerings vary — some specialize in furniture and housewares, others, like the Riverside Church in New York City, concentrate on clothing. Ruth Herrmann, the 80-year-old dynamo behind the church's clothing pro-

gram, says the biannual clothing sales bring in 700 people and \$18,000 to \$22,500. The clothing for the sale is culled from a constant stream of donations, most of which is passed on free to those in need. This two-tier distribution program works well, says Ms. Herrmann, because many people are too embarrassed to take clothing that the church offers free on a daily basis. "It's silly," she says. "But that's the way they feel."

If you don't belong to a church or community group that throws an annual rummage sale, keep an eye on the community listings in your local paper, and you'll probably see requests for donated items. Be sure

your donations are clean and as sound as you can make them. They'll be more likely to sell, and less likely to be packed in the cellar or hauled to the landfill at day's end.

Finally, when you do lug your too-tight boots and the living-room curtains down to the thrift store or the church basement, take a minute to browse. You might find that someone else's discarded curtains are just what you've been looking for, which means your demand for the item won't use new resources. By doing your shopping there, you'll be "closing the loop" — providing markets for useful goods that might otherwise be thrown away. 



One family's throw-away is another's prize: Corey Smith's antique bed was rescued from a trash bin.

Paint: Schools, theater and dance centers, vocational rehab centers

Paper: Children's centers, day-care centers, learning centers, schools

Records and cassettes: children's centers, libraries, schools, thrift stores, used-book and -record stores

School/Institutional furniture: Arts centers, non-profit organizations, schools, shelters

Tools: Children's centers, schools,

thrift stores, vocational rehab centers

Toys: Day-care centers, learning centers, libraries, parks and recreation departments, schools, thrift stores

RESOURCES

BUILDING WITH JUNK

by Jim Broadstreet. 155 pages. Loompanics Unlimited, P.O. Box 1197, Port Townsend, WA 98368.

\$22.95 ppd. Where to find second-hand materials, and how to turn them into a house.

HOW TO SURVIVE WITHOUT A

SALARY: LEARNING HOW TO LIVE THE CONSUMER LIFESTYLE

by Charles Long. 232 pages. Summerhill Press Ltd. Order from Firefly Books Ltd., 250 Sparks Ave., Willowdale, Ontario M2H 2S4 Canada; \$13.85 ppd. An extremely practical book on hopping off the consumer treadmill.

NADDUM NEWS

1200 Old Dump Rd., Big Fork, MT 59911; (406) 837-5548. \$20 a year for the dumpster-diver's bimonthly bible.

WASTE EXCHANGES

Businesses can write to the EPA for a list of waste-exchange programs. Pollution Prevention Information Clearinghouse, c/o SAIC, 8400 Westpark Dr., McLean, VA 22102; (703) 821-4800; fax (703) 821-4784.

Guide to the Three Rs:

REDUCE, REFUSE, RECYCLE

Has someone hurled jargon at you recently, rattling off the phrase "reduce, reuse, recycle"? Did you feel out of the loop? Relax. The revised Three Rs are easier to grasp than reading, 'riting, and 'rithmetic (and more apt, because these three words actually begin with 'R').

The point of this new triumvirate is simple: We need to change the way we think about buying and using everything from food to furniture, adjusting our *habits* to minimize waste. America's philosophy of consumption needs an overhaul.



REDUCE

By this, the pundits mean you should try to keep garbage out of your house in the first place, so you never have to worry about getting rid of it. Say you could buy pickles in a glass jar, or pickles in a plastic tub wrapped in newspaper nestled in foam peanuts and shrink-wrapped. You go garbage-free, right? Garbage may be the ten extra layers of packaging on an ice-cream bar, or a cheap toaster that'll croak within the year — anything that sends too much/too soon to the landfill. So:

REUSE

It sounds simple. Instead of throwing away grocery bags and peanut butter jars, you keep them, right? Put your garbage in the bags, and fill the jars with marbles or flowers.

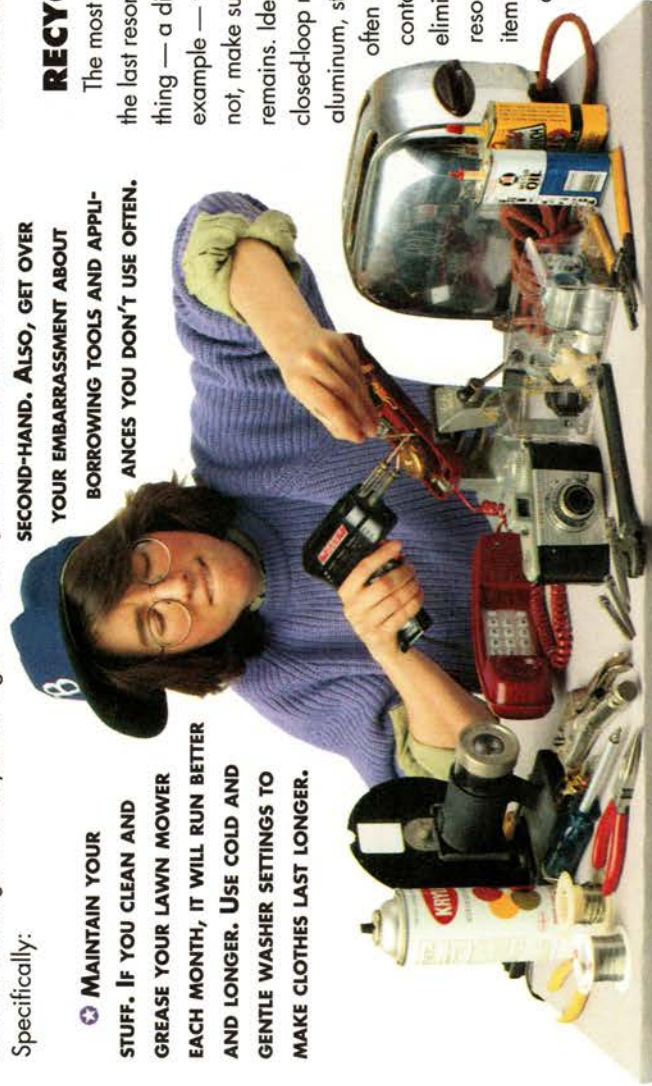
Come on — that's reusing for toddlers. Full-grown reusers never buy anything new that they can get used, and they never throw out anything that's got a twitch of life left in it. If you like to buy brand-new everything, you may need to start slow, by working to keep your old stuff around longer before you let it go. Specifically:

- ★ **MAINTAIN YOUR STUFF. IF YOU CLEAN AND GREASE YOUR LAWN MOWER EACH MONTH, IT WILL RUN BETTER AND LONGER. USE COLD AND GENTLE WASHER SETTINGS TO MAKE CLOTHES LAST LONGER.**

- ★ **CHANGE THE OIL IN YOUR CAR REGULARLY — YOU'LL ADD YEARS TO YOUR ENGINE.**

- ★ **FIX YOUR OWN STUFF. WHEN YOUR APPLIANCES, DISHES, TOYS, OR TOOLS BREAK, DO YOUR DARDEST TO MEND THEM, EVEN IF IT MEANS YOU PUT THEM TO AN "INFERIOR" USE AFTERWARD (A GLUED-TOGETHER MUG CAN BE USED TO HOLD PENCILS OR NAILS). BUY A GOOD REPAIR MANUAL TO KEEP APPLIANCES IN YOUR HOUSE, AND OUT OF THE LANDFILL.**

- ★ **REUSE OTHER PEOPLE'S STUFF. HAUNT THRIFT STORES AND RUMMAGE SALES, WHERE YOU CAN BUY THINGS SECOND-HAND. ALSO, GET OVER YOUR EMBARRASSMENT ABOUT BORROWING TOOLS AND APPLIANCES YOU DON'T USE OFTEN.**



- ★ **MAKE SURE YOUR STUFF GETS REUSED. WHEN YOU GATHER UP CLOTHING, OLD APPLIANCES, AND OTHER THINGS YOU NO LONGER WANT, USE THRIFT STORES, RUMMAGE SALES, YARD SALES, OR YOUR FAVORITE CHARITY AUCTION TO HELP YOUR DISCARDS FIND A NEW LEASE ON LIFE — IN SOMEONE ELSE'S HOME.**
- ★ **DIVE INTO A DUMPSTER! IF YOUR NEIGHBOR HAS CONDEMNED A USEFUL ITEM TO THE GARBAGE TRUCK, GRAB IT. RATHER THAN FEELING EMBARRASSED, FEEL FORTUNATE THAT YOU THWARTED A WASTEFUL ACT.**

RECYCLE

The most popular 'R' word is actually the last resort. If you've gotta have something — a dishpan or a jar of caviar, for example — whether you can reuse it or not, make sure you can recycle what remains. Ideally, make sure it can be closed-loop recycled — for example, aluminum, steel, and glass containers are often made back into similar

containers, closing the loop. This eliminates the need for virgin resources to make each new item. On the other hand, plastic and multi-material containers, with the (so far) occasional exception of detergent and soda bottles, cascade



to a lesser use — like a plastic flower pot — when they're recycled. To that end:

- ★ **MAKE SURE YOU KNOW WHAT MATERIALS YOUR COMMUNITY RECYCLES.**
- ★ **PURCHASE THOSE MATERIALS AS YOU SHOP FOR FOODS AND HOUSEHOLD GOODS.**
- ★ **PUSH YOUR COMMUNITY TO THE LIMIT: THEY MAY BE ABLE TO COLLECT OLD STEEL PANS ALONG WITH THE STEEL CANS, BUT ARE UNAWARE OF IT.**

- ★ **BUY IT TO LAST. A WELL BUILT-PRODUCT WILL NOT ONLY SAVE YOU REPAIR MONEY, IT WILL STAY AROUND LONGER. DEMAND OWNER-FIXABILITY WHEN YOU SHOP.**
- ★ **BUY IN BULK. TEN LUNCHBOX PACKS OF COOKIES USE MUCH MORE WRAPPING THAN ONE LARGE PACKAGE.**
- ★ **COOK FROM SCRATCH. YOU CAN STILL HAVE PANCAKE MIX: MAKE UP A BIG BATCH, AND STORE IT IN THOSE OLD PEANUT-BUTTER JARS.**
- ★ **IF YOU CAN'T AVOID A PACKAGE, OPT FOR ONE THAT'S MINIMAL AND RECYCLABLE.**

Population



RED-HOT REALITIES FOR A FINITE PLANET



TALKING ABOUT OVERPOPULATION LEADS YOU RIGHT ACROSS A BED OF COALS — RED-HOT REALITIES LIKE SEX, DEATH, WEALTH, POVERTY, POWER, AND MORALITY. THERE ARE NO EASY ANSWERS. BUT HAVING COME THIS FAR WITH A MAGAZINE LIKE **GARBAGE**, YOU MUST BE WILLING TO CONSIDER SOME OF THE CAUSES AND EFFECTS OF ENVIRONMENTAL PROBLEMS. ARGUMENTS RAGE ABOUT MAXIMUM SUSTAINABLE NUMBERS, BUT IT'S A TRUISM THAT THE MORE OF US THERE ARE ON A FINITE PLANET, THE LESS RAW MATERIAL AND ROOM TO MOVE (OR TIME TO PLAN).

TAKING STEPS TO CURB POPULATION GROWTH COURTS CONFLICT WITH A SPECTACULAR ARRAY OF SPECIAL-INTEREST GROUPS, FROM ANTI-ABORTIONISTS TO A HANDFUL OF RADICAL FEMINISTS WHO REGARD GESTATIONAL PROCESSES AS SACROSANCT. OTHERS WHO TAKE A DIM VIEW OF POPULATION CONTROL ARE MEMBERS OF MINORITY GROUPS AND NATIVE PEOPLES, WHO HAVE GOOD REASON TO WORRY THAT LIMITING THEIR NUMBERS COULD LEAD TO THEIR EXTINCTION.

BY STEPHANIE MILLS

At first glance, it may be hard to see how overpopulation could be your problem — the effects of overpopulation are seldom evident as such. But population is a factor (although not the only one) in every problem associated with urbanization and industrialization — growth.

Complicating our understanding further, there are dramatic regional differences in population growth-rates, and in per-capita resource-consumption rates, which means that the population problem is manifested differently in different parts of the world. In the developed world, overpopulation makes itself noticeable by compounding the consequences of excess: pollution, solid-waste disposal, automotive congestion, urban sprawl. In the developing world, the struggle for subsistence — from the land or sea — intensifies with every generation: Increasing numbers of subsistence farmers are driven onto lands that are unsuitable for farming; women are driven further afield in the quest for firewood; and fishery after fishery collapses from contamination and overexploitation. And, according to Zero Population Growth, for the past 25 years the rate of increase in atmospheric CO₂ — the greenhouse gas — has matched the rate of population growth almost exactly. So even in the wilderness you encounter adverse environmental effects, such as acid rain, which have been amplified and multiplied by overpopulation.

Once you grasp the implications of rapid population growth, it becomes difficult not to be strident about it. I know. I broke into the ecology biz back in 1969, announcing in my college commencement address something that seemed to be only common sense: People like myself, who thought that population was becoming an overwhelming problem, ought to do something about it, and not have children.

So I haven't. It seemed simple enough to me. The only thing that's going to reverse overpopulation is reducing family size to below replacement level. All that requires is birth control ... and rather a lot of social change.

THE AMAZING MATING MACHINE

But the time and room for debate are shrinking. World population stands at 5.4 billion now, and is expected to double in 39 years, according to the Population Reference Bureau.

Consider our history: In 35,000 B.C., according to best estimates, our species numbered 3 million. Livelihood was earned by hunting and gathering — very low-tech and sustainable. By 8,000 B.C., gardening had been invented, and our numbers increased to 8 million. With the arrival of the Bronze Age 4,000 years later, the human population reached 86 million. By the beginning of the Common Era, the numbers had increased to 300 million. At the dawn of the Renaissance 1,400 years later, there were 336 million people in the world. Steady growth that was alarming only if you happened to be an aboriginal occupant of a “new

world,” standing in the path of some empire's expansion. But in recent centuries, the growth has been compounding itself with shocking effect.

“In 1830, 1 billion people inhabited the Earth,” writes Population Institute President Werner Fornos, in *Technology Review*. “A century passed before the population reached 2 billion. Thirty years later, in 1960, it hit 3 billion; 15 years later, 4 billion; and by 1986 — only 11 years later — 5 billion ... the 6 billion mark could be reached in 1995.”

How did this runaway phenomenon come about? The basic constraints on the growth of any population of organisms are food supply, disease, and predation. Using our unique tool- and language-making gifts, we human beings have cleverly (if not wisely) evaded these constraints.

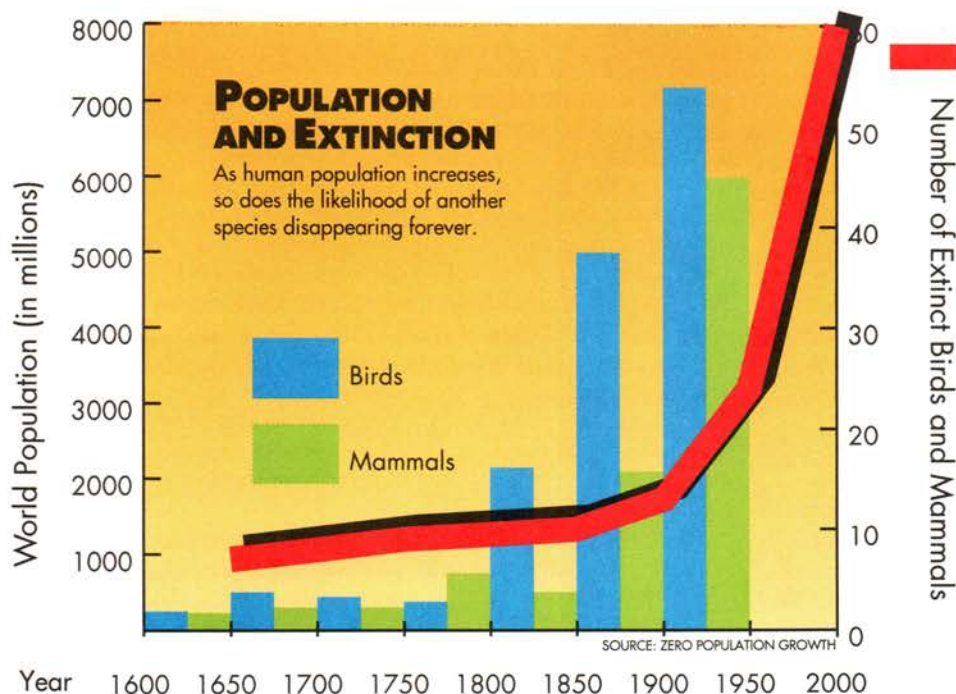
Since the days when there were only a few million of us, there have been quantum changes. Early on, we shifted from a nomadic to an agricultural civilization, increasing our food supplies and our ability to store food. This great change also marked the beginning of serious deforestation and the buildup of salt in irrigated lands. More recently, we tapped into the finite and never-to-be-repeated bonus of fossil fuels, which helped power the industrialization of agriculture and spurred urbanization. Disease control and greater food security decreased infant mortality.

This change in death rates is extremely significant. While human reproductive potential is fairly constant, the question of whether you live to exercise it is not. When the annual birth-rate exceeds the death rate, the population grows. So when family size exceeds two children, population growth follows. Every minute now, 180 people are born and 100 die, for a net gain of about 11,000 souls per hour.

EXPONENTIAL GROWTH

Population growth works like compound interest. If a couple has four children (the average number a woman bears today is 3.5), they've replaced themselves twice in one generation. If each of the children follows suit, there will be 16 grandchildren, then 64 great-grandchildren. In four generations, this Adam and Eve have multiplied





themselves better than 200 times. (How many showed up at *your* last family reunion?)

Mother Nature doesn't exhibit much tolerance for such growth patterns. In *Population Biology*, Thomas C. Emmel writes: "Exponential growth is abruptly terminated when the carrying capacity of the environment is surpassed and environmental resistance becomes effective more or less suddenly. Such growth curves are characteristic of rapidly reproducing and maturing annual plants, seasonal insect flushes, and man's population growth in recent years, but in general, they are very short-lived phenomena for obvious reasons."

There is a French riddle that illustrates exponential growth. Here's how it appeared in the 1972 classic, *Limits to Growth*:

"Suppose you own a pond on which a water lily is growing. The lily plant doubles in size each day. If the lily were allowed to grow unchecked, it would completely cover the pond in 30 days, choking off the other forms of life in the water. For a long time, the lily plant seems small, and so you decide not to worry about cutting it back until it covers half the pond. On what day will that be?"

On the 29th day, of course. You have one day to save the pond."

THE MORE THE MERRIER?

Well, things are getting pretty thick around the old lily pond, but we're still in denial about the necessity to limit our numbers. You can probably find some reasons in your own personal experience. How could all those perfectly human impulses — to bring forth and love children, to do like mom and dad did (or better) — be anything but good? The prospects of another baby to enjoy and another person to share the work and carry on the family name are compelling to parents, especially in agrarian societies. That can make zero population growth a tough sell in the developing world.

One screaming brake on our developing a useful approach to the population problem is theological. The dominant religions of the West reflect the premise that *homo sapiens* is the most important critter on the planet — God made man in His own image, after all — and this is reflected in the Biblical injunction to "be fruitful and multiply, and replenish the earth, and subdue it." These days there is a lively discussion over the accuracy of that King James translation, but valid or not, generations have read it as a manifest destiny.

Another impediment to perceiving and acting on overpopulation has been conventional economics, which activist and author Hazel Henderson has called "a form of brain damage." For the most part, economists have been so enraptured by growth, and the magic of markets, that they've been blind to growth's downside. The problem with economics is that it only values the things it can count. Much of what constitutes quality of life can't be measured or counted, and so is omitted from the definition of a successful economic system.

For example, economist Julian Simon, whose work has served as a rationalization for recent U.S. population non-policy, maintains that population growth generates its own solutions. An increased number of humans means not only increased inventiveness, but also additional demand, which will drive a search for substitutes for depleted resources, clean air,



and fresh water. Even if this worked, however, the resource for which there is no substitute is biodiversity. Dr. Simon's cheery optimism is bad news for other species.

WHO'S TO BLAME FOR OVERPOPULATION?

Even among those who agree overpopulation is a problem, there are strong disagreements. Within the environmental and social-change movements, population debate from the mid-'70s onward drifted into a polarity of contending world views, which I will call the Darwinists and the Marxists. Each defines the problem differently. (My apologies to scholars and devotees of these great thinkers, for employing the names as shorthand.)

To Darwinists, or "biological determinists," as they are sometimes known, the arrival of population equilibrium is an inevitability. The only question is whether it will come about through a decrease in birth rates or an increase in death rates from famine, pandemic disease, and war. Some Darwinists, like Earth First! co-founder Dave Foreman, have inferred that starvation and fatal diseases still have their rightful place in human ecology. It's a pretty unpopular view, but it does point out that our reluctance to employ birth control is far exceeded by our reluctance to give up death control.

Darwinists see planet Earth as an ecosystem, and our species as just one among millions, interdependent with all, and subject to the laws of nature. The detachment in this evolutionary view can tip over into an insensitivity to the tragedies of individual lives, and an obtuseness about politics. For one thing, human beings have all the votes on this issue, and it's all too human to place one's individual needs and desires before the good of the whole. For another, although *homo sapiens* is all one species, disregarding the inequality of means among people falsifies the picture.

The "Marxist" sector views the

problem as one of power — who's got it and who doesn't. They conclude that social oppression and economic imperialism are the essential causes of all great ills. The belief that scarcity is socially caused and socially curable has led analysts from this camp to regard any proposal to limit human numbers as an evasion of the real issue — revolutionizing social and economic arrangements.

Besides these people, there are the feminists, whose claim to an opinion on overpopulation is perhaps the most secure, because it is women's bodies and women's lives that determine — and are mostly determined by — reproduction. In all this discussion, it is important to remember that childbearing and nurturing have been women's lot, while policy-making has been the domain of men. Women are well aware that childbearing is one of the greatest causes of female mortality, and that generous spacing between births is healthier for all concerned, whether families are rich or poor. Consequently, mothers may have a slightly different take on the advantages of population growth than do merchants, bishops, generals, or kings.

"Overpopulation is just a symptom of a basic human-rights problem," says Hazel Henderson. The general idea is that if women were fully compensated participants in the economic life of their communities, and thus emboldened to control their fertility; and if men assumed equal responsibility for household duties and the nurture of their offspring, smaller families and greater

prosperity might well ensue. As it stands now, sexism is such a pervasive force in the world that a preference for male babies even drives Chinese couples into violations of their country's stringent one-child-per-family policy. And in most of Asia, North Africa, and Latin America the death rate for young women is higher than that of men as a consequence of neglect.

CARRYING CAPACITY: RECOGNIZING LIMITS

So — suppose we admit there's a complex interplay of social, cultural, and biological factors driving overpopulation. And that — thanks to the intervention of medicine, technology, and trade

How to UNDERMINE OVERPOPULATION

by Monte Paulsen

☞ Cherish fewer children

Support the decisions of relatives and friends who have two, one, or even no children. Avoid pressuring your children to bear grandchildren. And don't buy the stereotype that says single kids and single adults are unhappy — it ain't so!

☞ Spread the love around

If you've got a strong parental urge, consider adopting children rather than having your own. Make enriching the lives of other people's kids a part of your life.

☞ Onlies are O.K.

If you decide to have children, consider having only one; definitely stop at two. Each child born in the U.S. has an enormous impact on the environment, due to our heavy consumption of water, energy, and goods.

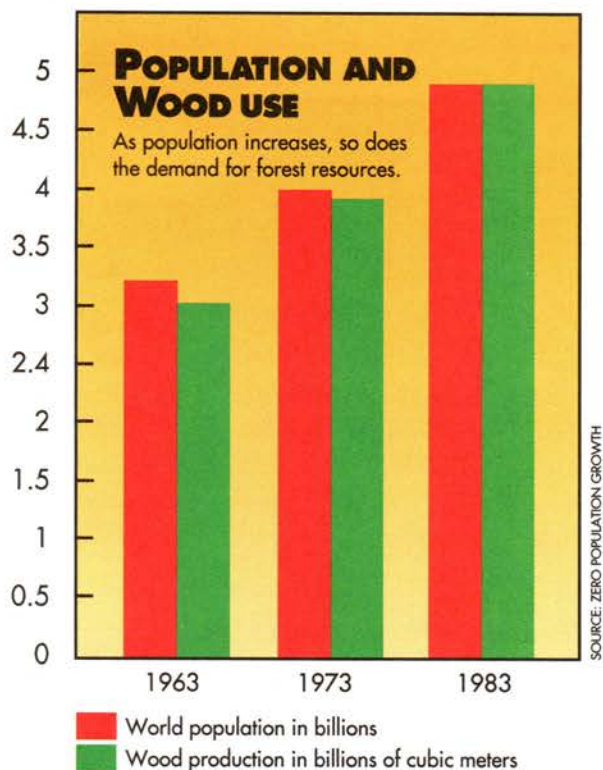
☞ Feed 'em local

When developing nations use scarce cropland to grow food for export, they deprive their own populations of that land. Feed your family sustainably-produced foods from your area.

☞ Don't overconsume

The use of a disproportionate amount of resources in developed nations aggravates overpopulation in de-

continued on page 51



— the consequences of population growth aren't always obvious. That complexity means that *any* action taken by individuals, communities, nations, and the community of nations will likely offend *someone*. Nonetheless, on a finite planet, maximizing human reproduction clearly comes at great ecological cost, and a considerable cost in human suffering. What would be a positive goal for humanity in all of this?

We need to determine an optimum human carrying-capacity for Spaceship Earth, then limit

our numbers to that. Then we must get on with the colossal tasks of sustainable development in the third and fourth world, and sustainable de-development in the first. The number-crunching for this modest project began in earnest nearly 20 years ago.

The aforementioned *Limits to Growth* was the report of a global modelling study that explored Earth's human-carrying capacity. Using systems analysis, computer projections, and a veritable world of data, the authors played out numerous scenarios for the human future, based on different trends in food production, resources, population, industrial output, and pollution. Assuming no change in present patterns, the authors predicted a crash in both population and industrial capacity by the next century. That was the bad news. The good news was that the Earth could sustain indefinitely a population of 6 billion at a European standard of comfort. We're due to hit that 6 billion mark in four years, however.

Besides the sheer number of us, our environmental impact has also to do with the choices that we, industry, and government make about resource consumption and waste disposal; about land use and transportation; about energy generation and conservation. Decisions about all those things can magnify or modify the impact of the increased human numbers.

Ecologists Paul and Anne Ehrlich, in their recent book, *The Population Explosion*, suggest the following equation for thinking about some of these interactions: Impact equals Population X Affluence X Technology, or I=PAT. Understood that way, there's no single culprit. I=PAT helps explain why population is not just a problem of the developing countries. Although countries like the U.S. and Japan have relatively low populations, this is counteracted by the abundance of affluence and technology. According to the Ehrlich equation, the environmental impact of a baby born in the U.S. will be 35 times that of an Indian baby, and 280 times that of a Haitian child. Therefore it makes both practical and moral sense for people on the affluent side of the equation to reduce their impacts on the environment by reducing waste and, ultimately, consumption, as well as by reducing family size.

OVERPOPULATION: WHY IS IT HARD TO TALK ABOUT?

Of course, if there is to be such a thing as family planning, let alone population control, there will have to be good sex education and unlimited access to contraception and abortion (because no contraceptive method is 100-percent effective).

I notice that now I feel rather nervous making that assertion,



which was commonplace during the '70s. It's a measure of the chill and fear that the anti-abortion movement has imposed on the discourse. I am not, I confess, very eager to confront their unreason and occasional violence.

Their lobby has had disastrous effects: a 42-percent reduction in domestic family-planning funds; an increased incidence of teenage motherhood; a thwarted introduction to the U.S. of RU 486, a promising abortifacient drug widely used in France; and the reversal of our international population policy. A 1985 amendment to the Foreign Assistance Act eliminated U.S. funding to the United Nations Fund for Population Activities (UNFPA) and severely reduced our support of the International Planned Parenthood Federation (IPPF) on the grounds that they supported programs that condoned abortion. The funding cutoff hit UNFPA and IPPF at a time when the vast majority of countries in the developing world had subscribed to the voluntary reduction of population growth and the promotion of family planning, and were ready for help.

Few are immune to the fear. As a Congressman and U.S. Ambassador to the UN, George Bush spoke of the need to curb the world's fertility. But he's wimped out now, giving Senator Albert Gore cause to note that "An objective observer would have to conclude that Bush

probably changed his mind on this question because he is politically scared of a tiny minority within the right-to-life movement." Perhaps not all terrorists live offshore.

Suppose we can muster the political backbone to weather the controversy, to preserve reproductive rights, and to support international family planning (a big if, but suppose). The promising news is that, despite overpopulation being a touchy subject for polite conversation, among the thinkers who confront it the old polarity seems to be shifting. A consensus seems to have emerged. Thus we find that Paul and Anne Ehrlich, the premier population-bombers of our time, have become very explicit in their advocacy of solutions that are embedded in a larger social context. The Ehrlichs maintain that the essentials of reduced fertility are "adequate nutrition, proper sanitation, basic health care, education of women, and equal rights for women."

It's hard to imagine a principled and humane person disagreeing with this approach (although Marxists and Darwinists might differ on significant details of population-control programs — say, incentives and punishments around family size). Coming up with the understanding, will, and wealth to act on the problem may seem impossible, however. The price tag for bringing about a stable population of 8 billion in the year 2050 would be about \$300 billion, writes Chicago bioregionalist Beatrice Briggs, in the magazine *Conscious Choice*.

"While this is a staggering sum," she continues, "it is useful

to consider that in the U.S. *each year* we spend \$2 billion on firearms and hunting equipment, \$4 billion on athletic footwear, \$118 billion on advertising, and \$300 billion on defense." If that doesn't put the price of population control in perspective, just try to imagine the necessities imposed by decently accommodating twice the Earth's current population, 39 years hence. 🗑️

Stephanie Mills has been a prolific writer and speaker on issues of population and bioregionalism for two decades. She is the author of Whatever Happened to Ecology, and the editor of In Praise of Nature. She lives in Maple City, Michigan.

veloping nations. As the saying goes, "Use it up, wear it out. Make it do, or do without."

🗑️ **Mandate equal opportunity for women**

Where women have better educational and economic opportunity, the birthrate has declined. Whether or not the fellows in the U.S. Congress ever pass the Equal Rights Amendment, it should be honored by everyone.

🗑️ **Make contraceptives available globally**

During the next two decades, three billion young people will enter their reproductive years. Currently, only about 50 percent of fertile women have access to contraception.

🗑️ **Don't outlaw abortion**

In the battle to undermine overpopulation, bear in mind that outlawing abortion doesn't improve family planning, it just leads to dangerous *illegal* abortions — and unwanted children.

🗑️ **Limit development**

Due to population growth, the world's farmers have to feed 95 million more people with 24 million fewer tons of topsoil each year. Use your vote to promote land-use policies that preserve open space and farming, not only as a means of production, but also as a local way of life.

Monte Paulsen is editor and publisher of Casco Bay Weekly, in Portland, Maine. This list was adapted from his series on personal ecology.



Drip Irrigation

The Trickle-Down Theory of Watering

BY ROBERT KOURIK

Drip irrigation, where water droplets seep (instead of flow) into the soil, gives more growth with less water. Compared to conventional sprinklers, which lose moisture to the wind and surface evaporation, this watering method can save 50 percent (or more) of your irrigation water. True, hoses and sprinklers often lead to over-watering and people can, in most cases, greatly increase watering efficiency with better timing. But they can't match the savings afforded by drip irrigation. As fresh water becomes an over-used resource, this trickle-down watering system may be the *only* way to manage wisely our water supplies — and our gardens.



SCOTT MACNEILL



IMPROVING YIELDS AND GROWTH

Although drip systems are a bit more complicated than dragging around a hose with an attached oscillating sprinkler, the benefits, in any climate, outweigh the hassles. How so? The gadget that regulates the slow flow of water is called an *emitter*. As water trickles out of the emitter, it soaks into the soil, directly nourishing thirsty roots.

Art Gaus, a horticulture specialist with the University of Missouri at Columbia, has used a drip system in his garden for nine years, even though Missouri's humid summers regularly nourish his plantings. One summer, using plastic mulch and a drip system, his garden produced 32 pounds of bush watermelons in just four square



Water seeps from a soaker hose (below) and in-line emitter tubing (left) to feed deep roots.



Owners of well-designed drip systems often report a marked reduction of such diseases as mildew, crown rot, and leaf rust.

Because a drip-irrigation system's polyethylene tubing and plastic parts are derived from fossil fuels, plan and install your system wisely, so you only have to do it once. With quality parts and adequate mulching, the plastic components should last for ten to twenty years. What's more, efficient water use will also conserve many gallons of fuel or kilowatts of electricity used to pump, purify, and distribute municipal water to your garden.

PHOTOS BY ROBERT KOURIK

feet of soil. Conventionally watering the same area usually produced 9 to 16 pounds of watermelons. He reckons that during California's droughts of 1980, '83, and '84, a well-timed drip system meant the difference between having a crop or losing a crop.

When people encounter drip irrigation for the first time, they are often concerned by the small wet spot that stains the soil's surface surrounding each emitter. "How can plants get by on just a few droplets?" they wonder. They don't realize that most of the water is efficiently dispersed below ground, out of view.

To understand how dripping works, buy a single emitter. Next, use an *emitter punch* (it cuts a tiny, circular hole) to pierce an opening near the bottom of an empty, plastic milk jug. Insert the emitter's barb, and fill the

one-gallon jug with water. Place the jug in a dry part of your garden. After the jug empties (which may take 24 hours because it's not under pressure), dig up the moistened soil next to the emitter (see illustration, left). The hole that remains graphically shows how the water will move through the soil.

Notice that the wet spot you've exposed is moist, but not soggy. This not-too-wet spot is the key to drip irrigation's superiority over all other forms of watering. With proper timing, a drip-irrigation system provides moisture without overly saturating the soil's pore spaces (which help the soil breathe). Thus, roots don't drown, the soil's beneficial bacteria can continue to release valuable nutrients, and harmful anaerobic fungi don't easily proliferate, allowing for better growth and greater yields.

THE PARTS

Three essential components make up the main assembly of a drip-irrigation system: A *backflow preventer* keeps water that's in the hosing from sucking dirt into your home's water pipes; a fine-mesh *filter* prevents the emitter's small orifices from clogging; and a *pressure regulator* keeps the non-threaded drip fittings from blowing apart. Appendages to the main assembly include polyethylene hosing and branched lines of drip hose called *laterals* or *subsystems*, each with emitters to control water flow (see illustration, following page).

To begin installing a drip system, use the garden-hose bib (faucet) closest to your plantings. First, connect the backflow preventer at every hose-bib that uses a drip system. The best

Drip-irrigation systems help any garden flourish, in any climate.

backflow preventer for a hose-bib assembly is a check-valve, which costs \$6 to \$20. The check-valve should be installed with the arrow facing *away* from the hose-bib, toward the garden.

Next comes the filter, often the Achilles heel of a drip-irrigation system. Without a good filter, the emitters can clog. Routinely cleaning the filter is essential. But we sometimes forget about filters that have to be disassembled for cleaning. Consider purchasing a Y-filter with a ball-valve for easy flushing. Priced from \$12 to \$15, a Y-filter is more expensive than other filters, but it's easily maintained.

The pressure regulator should keep water pressure below 25 pounds per-square-inch (psi). A hose that's porous (to be discussed below) must be kept below 10 psi, so the special fittings don't leak. Good-quality pressure regulators are sold with a specific rating of either 10, 15, 20, or 25 psi. In the main assembly, the pressure regulator must always be attached *after* the filter, so full pressure is available to flush the filter's screen.

WAYS TO DRIP

There are three basic types of drip systems: porous hose, drip irrigation hose with punched-in emitters, and in-line emitter tubing. Each has various benefits and limitations.

- **Porous hose**, also called soaker hose, isn't true drip irrigation because water oozes through the hose's *entire* surface (as opposed to dribbling from the end of an emitter). But it's an efficient, low-volume way to water. What's more, porous hose is comprised of either used tires or new tire trimmings combined with low-density polyethylene. So besides conserving water, you're supporting tire recycling.

The benefits: Porous hose is sturdy

and easy to attach to your hose-bib, and flexible for snaking it around plantings. Also, it can be buried in the soil; it works under pressure as low as 10 psi; and it's readily available through mail-order companies.

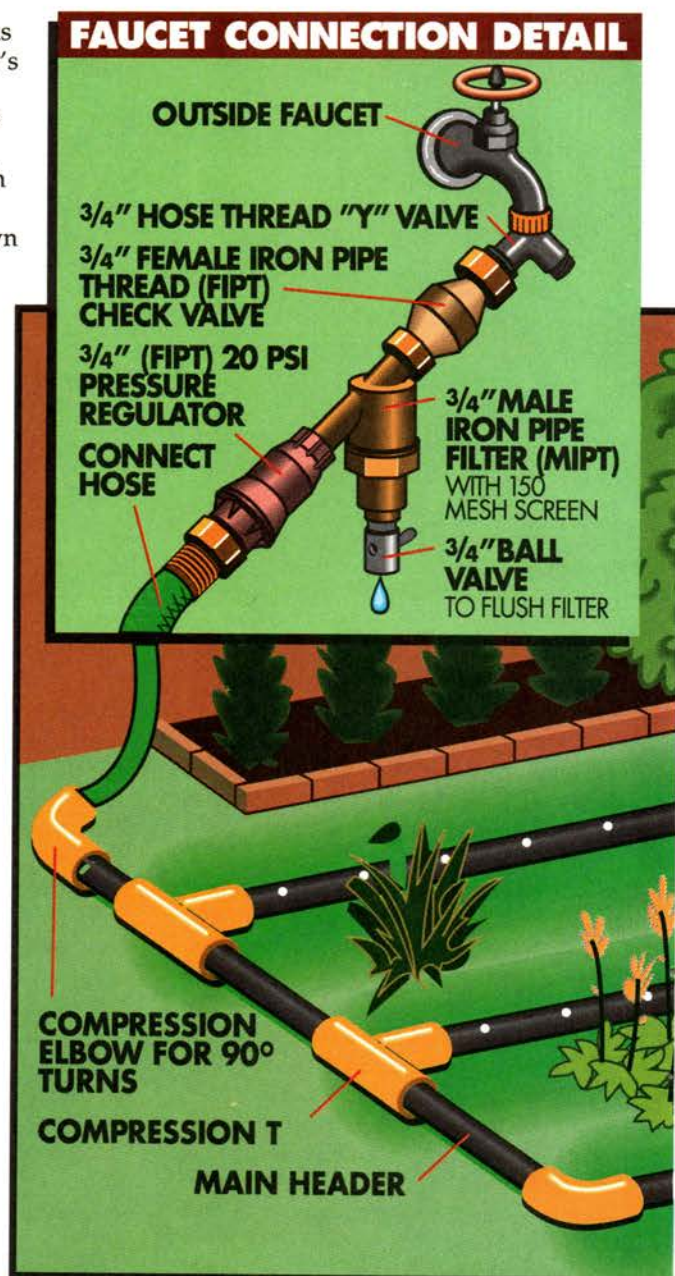
The drawbacks: The 5/8-inch diameter version is rather bulky; the hose clamps (often sold to guarantee the insert fittings don't leak) are expensive and eventually rust; and unchlorinated well water can produce an algae slime that seals the pores inside the tubing. What's more, porous hose can be used only on flat ground, to avoid variations in the flow.

Be wary of manufacturer's guidelines on how far apart to space each length of porous hose. An employee of a mail-order company that carries porous hose followed the company's guidelines for spacing the hose below ground. But the laterals were too far apart, and his lawn ended up with alternating stripes of green and brown. To get the brown out, he had to double the number of laterals. So before you bury a porous hose, do a test run to see how wide the wet spot will be for a given length of irrigation.

- **Emitters** come in flow rates of 1/2, one, two, and four gallons-per-hour (gph). They're inserted into a 1/2-inch-diameter (18mm), polyethylene drip-irrigation hose. Emitters are commonly used for what I call "point-source" irrigation, where one emitter is the only water source for each plant. There are also *regular* and *pressure-compensating* emitters. With regular emitters, the flow rate from one end of a hose to another can vary considerably. Pressure-compensating emitters are designed to deliver the same amount of water regardless of your garden's slope or the length of the drip-hose. If variations in your garden's elevation total more than 20 feet, or the drip hosing totals more than 100 feet,

you need pressure-compensating emitters. They cost 30 to 100 percent more than regular emitters, but they ensure that the flow is consistent throughout a punched-in emitter system.

The plusses: A pressure-compensating emitter with a drip hose easily winds around plantings; the connector fittings (called *compression fittings*) don't leak and they seal better with an increase in pressure (up to the system's limit of 25 psi); the emitters distribute water evenly and they're rated to work at a wide range of pressure (from 10 to 25 psi). Also, pressure-compensating emitters are less likely to clog than porous tubing; they can be punched into the



tubing exactly where the plant's roots are located; and they can distribute water as slowly as 1/2 gph for a gentle soak.

The limitations: Parts are not as widely available by mail-order as are those for a porous-hose system; the emitter's stem will get brittle with age and can easily snap off during weeding; in a large garden, installing hundreds of emitters can get pretty tiring.

• **In-line emitters** afford the best mix of efficiency, ease of installation, and resistance to clogging. The tubing is about 1/2 inch in diameter (16mm as opposed to 18mm for a "regular," 1/2-inch drip hose) and comes with emitters spaced at regular intervals inside the tubing, rated to dispense either 1/2 or one gph. These internal emitters are arranged to create a continual vortex that keeps sand or silt in suspension, so they won't clog the system. Slightly below the soil's surface, internal emitters leave bulbous-shaped wet spots that meet to form one continuous "moist zone." (The hose is available in both non-compensating and pressure-compensating versions.)

The benefits: Pressure-compensated, in-line emitters are easy to install and they clog less than porous tubing; of any system, they work under the greatest range of pressure (five to 25 psi); and they provide consistent flow rates, even on hilly terrain. Also, there are no external parts to snap off; the connector fittings don't leak; and the compression fittings seal better than the clamps that attach to porous hose.

The drawbacks: They require extra planning for plants placed far apart and at odd intervals; they aren't as pliable as porous hose; and they aren't carried by very many mail-order or retail outlets.

FREQUENT, "SHALLOW" WATERING

To spur moisture and nutrient absorption, concentrate irrigation and fertilizers in the upper soil layer. Frequent waterings (if you avoid puddling) produce the best growth. In rainy areas, if watered just enough be-

tween periodic storms to maintain a moist (but not wet) soil, your garden will produce higher vegetable yields or lush, ornamental foliage.

I prefer frequent watering with small amounts of water, sort of like "topping off the tank". Here in California, after the winter rains are over, irrigation begins when the soil has reached an ideal moisture level — not too wet and not too dry. The goal is to replace the amount of moisture lost to both evaporation from the soil and transpiration from the plant's leaves (called the evapotranspiration rate, or ET), while adding enough extra water for gorgeous growth. Your County Cooperative Extension can give you the ET rate for your regional climate, and instruct you on how to figure optimal irrigation times for your drip system. For one of my clients, drought-resistant plantings needed only four to eight minutes of irrigation per day to maintain vibrant, healthy growth.

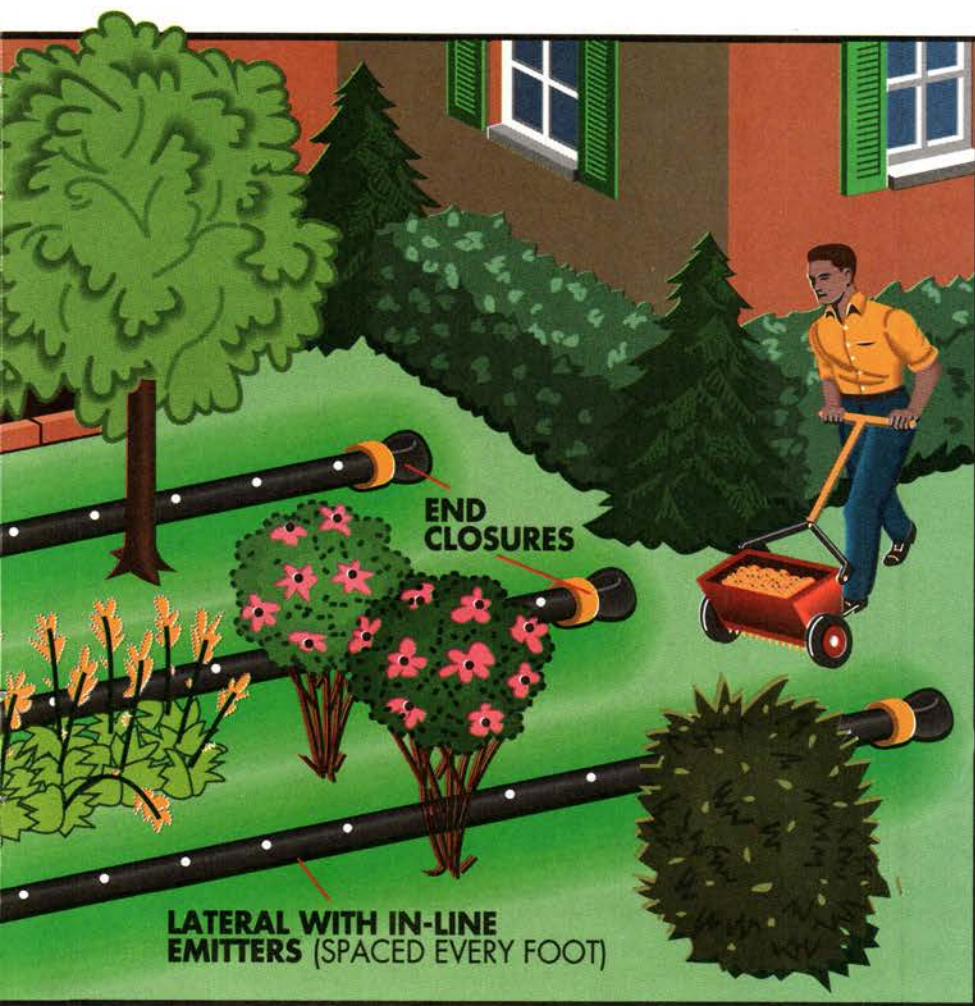
Of course, if your water supply is extremely limited, then infrequent waterings may be the only option. Instead of running the drip system for a long, continuous period, break the irrigation time into several waterings. This allows the soil to drain and breathe.

If you're intimidated by any device more complicated than a hand-operated can opener, rest assured that drip irrigation is nowhere near as complicated as it looks. Think of all the parts as an adult version of Erector Sets. Start with a small system, watch the results as the plants grow, and adjust accordingly before expanding. Drip irrigation isn't just a desperate technology for water-strapped Westerners. It's a water-conserving tool that can make any garden flourish, in any climate. ♻️

The drip-irrigation hardware mentioned in this article is available from:

- The Natural Gardening Company
San Anselmo, CA (415) 456-5060
- Harmony Farm Supply
Graton, CA (707) 823-9125
- The Urban Farmer
San Francisco, CA (415) 661-2204
- Gardener's Supply Co.
Burlington, VT (800) 548-4784

This article is excerpted from Robert Kourik's forthcoming book, Drip Irrigation for the Home Landscape. To be notified of publication, write to Edible Publications, PO Box 1841, Santa Rosa, CA 95402.



SCOTT MACNEILL

Who Owns Exxon? We Do.

Thanks to "pension-fund socialism," environmentalists may turn out to be the economic reformers of the 1990s. But who knows if they will succeed.

The most intriguing thing about the Valdez Principles — newly hatched guidelines for corporate environmental practice — is neither the companies that have signed up to endorse it, nor those that refused, nor the majority still mulling it over — nor even the engaging, clever activists who put the Principles together. The intriguing aspect is the investment climate which provoked those activists in the first place. It's as if, since 1974, the United States economy has been the victim of a giant-scale practical joke. And only now has anybody started to figure out the punch line.

If a nightclub comic were to tell the joke, he might start by asking a simple question. Who owns most mainstream companies? Robber barons, right? Fat cats. Investors with last names like Du Pont, Morgan, and Mellon — descendants of the industrial exploiters of the 19th century — plus a few modern-day barons like Trump, Milken, and Kravis. They all learned what Kurt Vonnegut Jr. described so evocatively in his 1965 novel *God Bless You Mr.*

Rosewater: How to slurp from the "money river," the river of profits from investment, "the widest, deepest river of wealth ever known to man." If you befriended or scared the right people, said Vonnegut's lead character Eliot Rosewater (a disenchanted, middle-aged rich kid with a drinking problem), you would "be shown a place on the riverbank, and handed a bucket all your own. Slurp as much as you want, but try to keep the racket of your slurping down. A poor man might hear." (Incidentally, although *Rosewater* never achieved the popularity of *Slaughter-*

house 5, it is a cult favorite among disenchanted rich kids — with or without drinking problems.)

In the early 1970s, with almost no public notice (not even their own), the workers of America learned to slurp at the money river. One person who *did* notice was the eminent Austrian-born management/economics writer Peter Drucker. In his 1976 book *The Unseen Revolution*, he said the United States was becoming the world's first truly socialist country. American teachers, teamsters, corporate full-timers and city employees were, in aggregate, squirrelling away billions in more than 50,000 pension and retirement funds. The funds, in turn, invested that money in the stock market. By now, as Drucker pointed out in the *Harvard Business Review* this spring, pension funds have \$2.5 trillion in assets, are enormous industrial lenders, and own 40 percent of American common stock — enough for a controlling interest in most companies. Who owns Exxon, GM, Du Pont and Citicorp? We do — at least those of us with pensions.

But the joke's on us. We might own America, but our influence falls within harshly narrow limits. The reasons go back to the 1940s, when then General Motors chairman Charles Wilson designed the first modern pension fund. He decreed that it should invest in all possible stocks, instead of just GM. That way, if GM's stock price suddenly collapsed, its pensioners (who vividly remembered the Great Depression) would be protected. Wilson was probably thinking of this pension fund when he said that what was good for GM was good for the country.

Wilson's design caught on among corporations, and Congress eventually wrote it into law, more or less, as the 1974 Employee's Retirement Security Act — colloquially known in investment circles as "ERISA" (pronounced to rhyme with "Melissa"). By the



BY ART KLEINER

1970s, pension-fund investments had become gigantic child-tyrants in the market, fussed over by independent stock analysts, whose only job (as "fiduciaries") was to get the best possible payback every day for their aging beneficiaries. Because of protective state laws, these fiduciaries could not take a personal interest in any company, or even bet a long shot; if they lost money for their pensioners, they could be liable for malpractice. This liability scared away banks, and suddenly small boutiques opened for managing pension funds, using computers to track stock performance on an almost moment-by-moment basis.

You may remember the "Greed is Good" speech in the movie *Wall Street*, where takeover pirate Gordon Gekko persuades stockholders that the management of their company is more corrupt than he is. In real life, his audience would have been pension-fund managers' representatives. Most of them would have felt honor-bound to go along with his offer of a higher stock price, no matter what they thought of his ethics. They would care as little for the company as a bookie might care for the health of Lucky Lady running in the 12th tomorrow at Aqueduct, and for the same reasons. Tomorrow, after all, would be another horse race — and they might not even own the company by then.

Thus, however well-intentioned its design, the pension-fund system has evolved into a monstrosity. It faces the same built-in dilemma as Social Security — funding an ever-growing proportion of senior citizens from an ever-shrinking work force. Another problem stems from the nature of trading: if *one* investor goes after quick gains, he or she will likely prosper. But if *all* major investors do the

same, they will all lose. (Indeed, many pension funds, despite best efforts, have consistently undershot the stock market.) Meanwhile, the pension funds' need for quick profits, on top of debt from Gekko-like takeovers (which pension funds encourage) pressures managers to cut back new investments to the bone. That makes it hard for a healthy economy to thrive in the long run. It also undercuts environmental protection: Consider Pacific Lumber's desperate battles to cut down its old-growth redwoods in California, to satisfy its debt-laden new corporate parent, Maxxam. In the end, the system of pension-fund investment hurts the very future which pensions were designed to safeguard in the first place. End of joke. Drum roll.

Yet that punch line holds a hidden promise. Some sharp political veterans now have jobs managing pension funds: former New York City comptroller Harrison Goldin, current comptroller Elizabeth Holtzman, and Gray Davis, the chief of staff of former California Governor Jerry Brown. What if they — and the workers they

represent — woke up to the fact that they own the corporations? What attitudes might emerge about growth, the legacy of the future, the way companies are managed? Eventually somebody had to pose the question. During the past year or so, that task fell — of all people — to a group of environmentalists.

"The conscience of a company has to rest somewhere. The managers feel it's the CEO, the CEO feels he's accountable to his Board, and the Board is trying to second-guess the shareholders. So let's give our voice about ... building a kind of world that the children of our participants will live in. The quality of that society will be the single most important factor in the quality of their retirement."

The speaker was Wayne Silby, a slim, dark-haired man in his early 40s; the audience was the Financial Executives Institute, composed of the most powerful corporate pension-fund administrators from Fortune 100 companies. Originally from Iowa,



ILLUSTRATIONS BY KEITH BENDIS

*Faced with the Valdez Principles,
companies are introducing their own
codes of environmental ethics, or
debating such codes at top levels.*

Silby has a quick-witted, sardonic, and yet wholesome mien; he could have been a model for the running shoe entrepreneur played by Kevin Kline in *The Big Chill*. He had traveled through India, then (after law school) had co-founded the Calvert Investment Group, which dealt in "variable-rate securities" — refinancing government-insured loans. Calvert had endured its own Big Chill-like rite of passage. In the late 1970s, employees worked in blue jeans and bare feet; "customers would come in," Wayne would later reminisce, "and put their life savings down on a cardboard table." Then one of his staffers tried to steal \$1.5 million. "I started wearing a tie the next day."

In 1982, Silby had set up a "social investment" fund within Calvert (which by then managed \$1 billion overall). They screened out companies which dealt in tobacco or alcohol, polluted the air or water, built weapons systems, discriminated against women or minorities, produced nuclear power, or did business in South Africa. That list — taken verbatim from a *Washington Post* story — sounds simple, but the screening was not. Contrary to the expectations of some Calvert staffers, the fund took off. Silby discovered that a company with good "social" indicators and solid finances made for good investments in the long run. Environmentalism, after all, breeds efficiency; fair workplaces inspire enduring loyalty. And as the Japanese have demonstrated, efficiency and loyalty lead to stable profits.

Calvert did not dramatically outperform other money-market funds, but it remained above average throughout the 1980s and built a following. It also inspired a half-dozen similar funds (the Sept-Oct 1990 **GARBAGE** analyzed most of them). More importantly for

this story, Silby found himself increasingly tapped to be an arbiter of corporate performance. When he questioned Arco's environmental-protection policies in Alaska, the oil company's chairman invited him to visit; he and his group tooled around Arco's drilling sites with the president of Alaska operations. And other leaders of social-investing funds were having similar experiences — most notably Joan Bavaria, the charismatic 45-year-old president of Franklin Research and Development, an independent Boston-based company which performed much of the research on which "social investing" companies based their decisions.

In 1989, Bavaria assembled CERES, the "Coalition for Environmentally Responsible Economies," whose 165 members were evenly divided between environmental groups, investment groups (like Wayne Silby's Calvert), and miscellaneous government agencies and economists. Significantly, the members included Elizabeth Holtzman and Gray Davis, representing two of the largest pen-

sion funds in the country: New York City and California employees. Another founding member, and co-chair along with Bavaria, was Denis Hayes,

who is best known as the organizer of Earth Day in 1970 and 1990. But Hayes is also a lawyer, and during the mid-1980s he had begun investigating the potential poverty of the pension-fund system, thinking of writing a book about it. "Then I got lured," he said recently, "into doing some legal work against sleazebags who looted and pillaged savings & loans." CERES fit not just with Earth Day, but with his other current project too — the still-under-development Green Seal rating system for products.

Bavaria had the idea that brought CERES together: creating a list of potential rules for environmentalist companies, along the lines of the Sullivan Principles for corporate investment in South Africa. Of all the people who had tried to reform institutional investing (including Peter Drucker), only the Sullivan Principles had ever seemed to have much influence on pension-plan managers. Here again, General Motors figured prominently: a black minister from Philadelphia, Leon Sullivan, had been added to the GM board after a proxy battle over



minority representation in the early 1970s. Sullivan developed his principles as a guide to fair treatment of blacks within businesses that operated in South Africa. But he later changed his mind, denounced his own principles as lacking teeth, and (working with a coalition of church investment groups) pressured many companies, including GM, to divest from South Africa entirely.

Sullivan's enlistment of large-scale investors provided an example for CERES; the Valdez oil spill provided a name. There were ten Valdez Principles in all, drafted with agreement among the CERES members (listening to Bavaria talk, I got an impression of endless telephone debates over minor wording changes). The first six principles are such standard tenets of corporate environmentalism as sustainable use of natural resources, waste reduction, "wise use" of energy, and the marketing of safe products.

But the last four principles had more — well, more teeth. Number seven suggested that after causing any ecological damage, companies would "make every effort to fully restore the environment and to compensate those persons who are adversely affected." Number eight promised to disclose any potential environmental, health, or safety hazards. Number nine promised to appoint someone representing environmental interests onto the board of directors of the company. And number ten promised an annual public audit of a company's progress.

How successful have the Valdez Principles been? Depends on how you define success. The 21 companies that have signed so far include some iconic standard-bearers of Good Business Practice: Smith and Hawken Tools, Stonyfield Yogurt, and the Aveda cosmetics company. (Ben & Jerry's ice cream company is reportedly considering signing.) Some giant companies, including such prominent large "environmentalist" firms as Du Pont, McDonald's, and General Electric,


were targeted by CERES members (notably by church groups, who by now are old hands at stock proxy battles). These companies are ruminating over the Principles. Signing would mean tremendous public-relations value (CERES encourages companies to announce that they have signed them); but corporate lawyers have worried that the Valdez compensation and disclosure clauses might give potential litigators more grounds for a lawsuit.

More significant still is the effect which the Principles might have on institutional investors. The pension-fund managers whom Wayne Silby spoke to, a year and a half ago, sat stonily through his talk. They asked if he wanted them to invest in charity projects, like subsidized housing for the homeless, and sacrifice their return on investment. But this October, the Association for Basic Management Research — a group of pension-fund analysts — held their own conference on socially conscious investing. Meanwhile, investors' resolutions at 40-odd companies will be voted on this spring, sponsored by CERES members, suggesting that GE, Du Pont, Chrysler, GTE, and others sign the Principles. Most of the proxy battles will involve institutional investors — who flexed their muscles a little bit in 1989 by forcing Exxon to add an environmentalist to their board of directors. (The funds suggested Robert Redford, Gary Hart, or Gaylord Nelson, the senator who had first suggested Earth Day. Instead, Exxon chose Dr. John H. Steele, the president and senior scientist of the Woods Hole Oceanographic Institution.)

Most of these proxy battles will probably fail; last year's Valdez Principles resolutions scored around five percent of the vote each. But Silby, Bavaria, and Hayes, each in their own way, insisted that wasn't the point. Five percent is considered a fair showing for a first-year proposal. Also, faced with the Valdez Principles, companies and industries are introducing their own codes of environ-

mental ethics, or debating such codes at top corporate levels. Some of these ethics include agreements (by Kodak, Ford, GM, Corning, American Express, Gannett) to answer CERES' intensive questionnaire. Sometimes, this represents the first time a CEO has considered his company's pollution or energy practices.

Like many of the corporate reform efforts of the past few years, the Valdez Principles will require an immense amount of data-gathering about companies. Indeed, CERES' people (while they've released their first questionnaire for corporations, in a booklet resembling an SAT exam) are still deciding what sorts of disclosure they should require from companies. Should they seek pollution-measuring numbers? Or (asks Bavaria) will numbers turn out to be as potentially misleading as budget projections have been in the financial world? (That's the unknown scandal of the "bottom line": all too often, it doesn't measure anything.) If CERES describes a company's record in words, how can they ensure that the words are fair? They'd have to standardize such evanescent forms of data before one company's good works could be measured against another's.

But no less a luminary than Peter Drucker is writing that systematic audits can be conducted — indeed, *must* be conducted — before the problems in pension-fund socialism can be resolved. Institutional investors can't make hunches: they need data. With what Drucker calls "systematic audits" of every aspect of a company's performance, they can reward those companies that actually think ahead. Environmentalists wouldn't have even been part of this reform ten years ago; now, if the Valdez Principles continue to grow in influence, they'll lead it. 

*Art Kleiner is a regular contributor to **GARBAGE** on issues pertaining to corporate environmental policies. Last year Art began working on a book called The Age of Heretics, to be published by Doubleday in 1992.*

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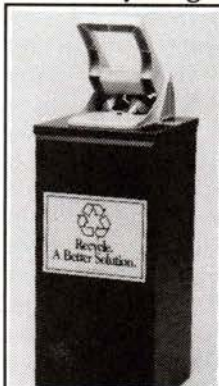
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Source: Tire Retread Information Bureau; U.S. DOE

BIG TIRES, LITTLE TIRES

Ratio of bicycles to autos, 1988



Source: Worldwatch

FUN FACTS

Length of IRS purchase order for subscription to **GARBAGE**:

7 pages

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15.3	1850	84.7
39.6	1900	60.4
64.0	1950	36.0
72.8	1989	27.2

Source: U.S. Census Bureau



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Federal funds for the Family Planning Program, 1971 through 1973:
\$162 million

Unwanted pregnancies, 1973: **14.3%**

Federal funds for the Family Planning Program, 1980 through 1982:
\$448 million

Unwanted pregnancies, 1982: **7.7%**

Federal funds for the Family Planning Program, 1986 through 1988: **\$421 million**

Unwanted pregnancies, 1988: **10.3%**

Federal funds for the Family Planning Program, 1989 to 1991: **\$415.5 million**

Unwanted pregnancies, 1991: **as yet unknown**

Family planning clinics in U.S., 1981: **5,000**

Family planning clinics in U.S., 1989: **4,000**

Source: Planned Parenthood; Zero Population Growth

Bat Condos, Mouse Chalets, and the Garden Doctor

PRODUCTS

Bat Condos

It's springtime, and as they have since time immemorial, mosquitoes are whining up out of the marshes, inflicting red welts on all creatures great and small.

Past tactics for battling the whining menace were to pour diesel oil into swamps to suffocate the mosquito larvae, or to spray with DDT. Despite finely tuned biological weapons now proving effective, the bad old days aren't completely gone. When mosquito-borne Eastern equine encephalitis — a disease fatal to horses and people alike — turned up in southeastern Massachusetts last summer, the state resorted to spraying 800,000 acres with the potent and controversial pesticide malathion. (Organic gardeners were given large balloons to make their properties visible from the air.)

If you're under mosquito siege and you don't want to call the local crop duster, one of the hardest-working natural enemies of the mosquito is that nocturnal winged wonder, the bat. The common little brown bat, who weighs just half an ounce, is capable of nipping 600 mosquitoes an hour from the night sky. Bats and rabies are often mentioned in the same alarmed breath. However, each year family pets cause more deaths than have bats during the past 40 years.

You may be able to lure bats closer to your home by putting up a bat house. Bats that aren't settled happily in a tree (or your attic) will consider the invitation, as long as food (mosquitoes, moths, and other night-fliers) and water (they may settle for a swimming pool) are nearby. You'll get fewer mosquitoes and the bats will get good habitat — something that Bat Conservation International says is dwindling.



MERIND D. TUTTLE

Give bats a home, and they'll keep mosquitoes on the fly.

Bat condos, as they're sometimes called, can be nailed to a tree or a wall, from 12 to 15 feet above the ground. The bats scoot in from the bottom, and sleep hanging from roughened wood partitions that are spaced from 3/4 to 1-1/2 inches apart.

Bat houses may be available locally through a nature center. Bat information, houses, and house-construction plans are available by mail from Bat Conservation International, P.O. Box 162603, Dept. GM, Austin, TX 78716; (512) 327-9721. Plans: \$2.25 ppd. Houses: single-chamber (holds 25 or more bats), \$36.95 ppd; four-chamber (50 or more bats), \$51.45 ppd.

Mouse Chalets

Mice. So cute. Such a pain. Even getting rid of them is painful, and not just for the mouse. People, too, feel pangs when they hear the SNAP! of a trap or the rustle of the little furry ones stuck to a glue board.

The Smart Mouse Trap is, I suppose, sappy



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JACK CUTTER

as products go, but it's also clever. It's sort of a Swiss chalet in green or red translucent plastic with a spring-loaded door, and a mouse-proof slot for a cracker. When Mr. Mouse crosses the threshold to sniff at the cracker, the door snaps shut, and he's held prisoner. Unlike a wire live-trap, the Smart Mouse Trap has no holes in which mouse-feet or kid-fingers can get stuck. (Breathing holes prevent him from suffocating.)

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Unless you take him a fair distance into the woods, or release him in your neighbor's kitchen, he may hustle right back to where the livin' is easy. But maybe you'll gain enough time to locate and plug his entrance.

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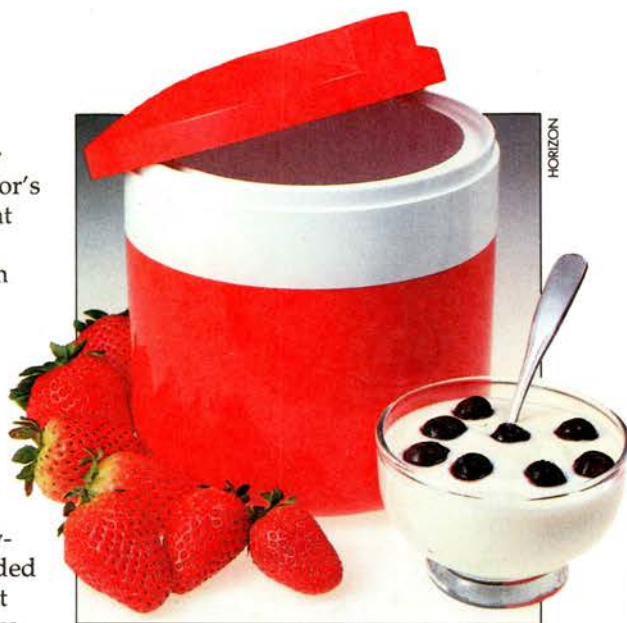
Yogurt Maker

It's the curse of the New-Age generation: They decided on a healthy, minimal-meat diet, only to discover that yogurt always comes in a heavy-duty plastic container. Being too Earth-conscious to throw the tubs in the trash, members of the yogurt generation are easy to spot after a look into their cabinets: stacks of plastic containers waiting for a use.

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With the tub comes a thermometer (yogurt cultures multiply only under optimal temperatures) and a ceramic disc that prevents milk from burning as it boils. (Cheese-lovers with cholesterol worries should inquire about the companion soft-cheese maker, which can turn non-fat yogurt into a sort of farmer's cheese.)

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RESOURCES

The Garden Doctor

1684 Willow, Denver, CO 80220. Quarterly. \$18.

It defies description, but here's a go: It's a collection of garden-related ... no, environment-related ... no, unrelated tidbits of what might (in the right circles) pass for wisdom. It's a magazine-shaped magazinelette that looks like it's printed by Fred's Copy Shop. Inside is a smorgasbord of opinion, how-to advice, scientific fact, and zany graphics, presented with what appears to be the scissors-and-photocopier system of art direction.

But the earnest art staff is augmented with people who traditionally have a hard time finding employment. Retarded adults use magic markers to color a headline here and a photo there.

The Garden Doctor is rife with articles ... or columns? ... let's just say, words. A recent "Shared Secrets" column covered such delightfully unrelated topics as how to make a mosquito trap; why birds like peanut butter;

and how hens can solve pest problems. In "Toddler Fodder," parents are given a science project to do with their children (like sprouting seeds on a sponge farm). Another article, for adults, delves deep into sprouting — what seeds make good sprouts, when to harvest them, and how they taste.

Besides the crazy collection of useful knowledge, there are essays, poems (not as gruesome as I feared), and anecdotes. The December 1990 issue offers thoughts on enjoying the long, dark, (depressing) days of winter, the composition of honey, the charm of clotheslines, and Italian herbs. And each issue comes with three packets of home-grown seeds. Buried in the magazine are instructions for planting.

Throughout the two-dozen pages are etchings of animals and plants, quotes-from-the-blue (*I had a pleasant time with my mind, for it was happy. Louisa M. Alcott*), and stray facts (*In 1978 a carrot weighing 15 pounds 7 ounces was grown by Ms. I.G. Scott of Nelson, New Zealand. — Guinness Book of World Records*).

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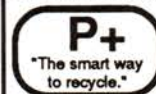
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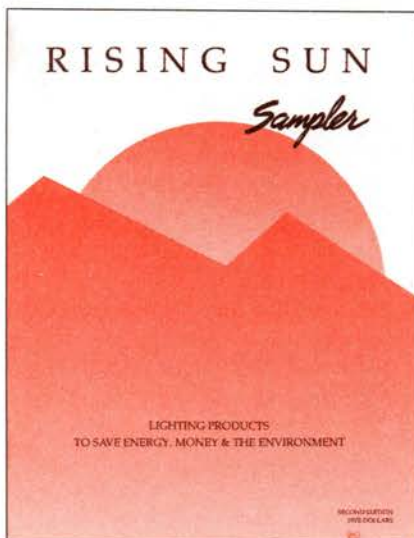
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Fluorescent lights have become one of the enigmas of the green revolution. While every "10 ways to save the Earth" brochure, book, and newspaper column includes an entry urging people to dump incandescent bulbs and screw in fluorescents, these bulbs are dogged by worrisome questions. Rumors of radioactive elements, mercury, and electromagnetic radiation refuse to die. Such dark topics cloud the bulbs' bright green image.

The Rising Sun Sampler, a catalog of low-energy lighting products, answers 19 common questions about compact fluorescent lighting: What happens to the mercury? Do all bulbs contain radioactive elements? How can you maximize a bulb's life?

The tone of the answers conveys a predictable bias, but the hard information is there for

those who want to make up their own minds. For example, while the authors concede that mercury in fluorescent bulbs presents an environmental problem, they argue that if all our lights were incandescent, the increased energy demand would release 300 additional tons of mercury. In other words, environmental problems have no perfect solutions.

The body of the catalog presents a wide range of bulbs, floodlights, accessories, and indoor and outdoor fixtures available by mail order. Included is a *Consumer Reports*-style chart that rates all the bulbs for equivalence to incandescent bulbs, power consumption, avoided energy cost and CO₂ emissions, appropriate uses, and temperature tolerance.

My only beef with Rising Sun lies in the answer regarding radioactivity. The authors state that only "certain" compact-fluorescent core-coil ballasts (the bulb's "engine") contain radioactive elements. Fact is, every compact core-coil ballast that screws into a normal fixture has radioactive elements. (Electronic-ballast bulbs don't use radioactive elements.)

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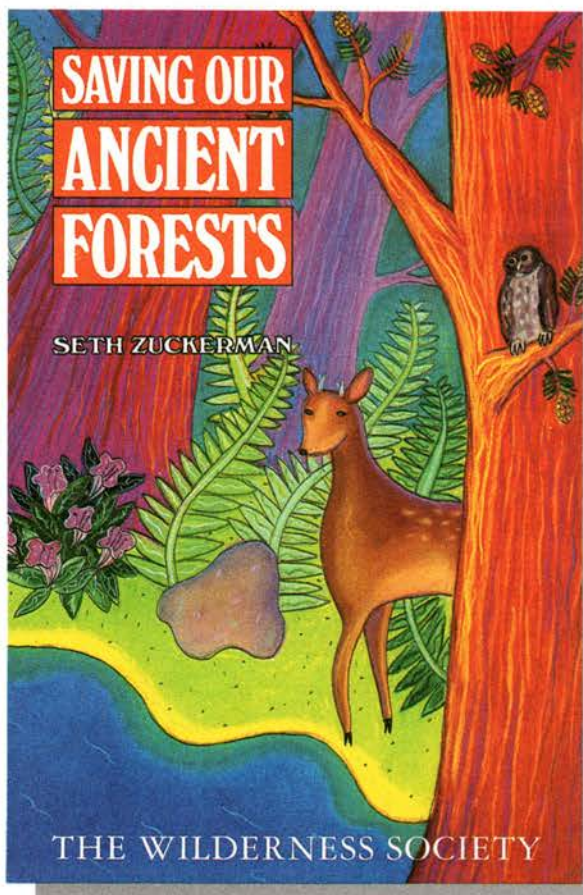
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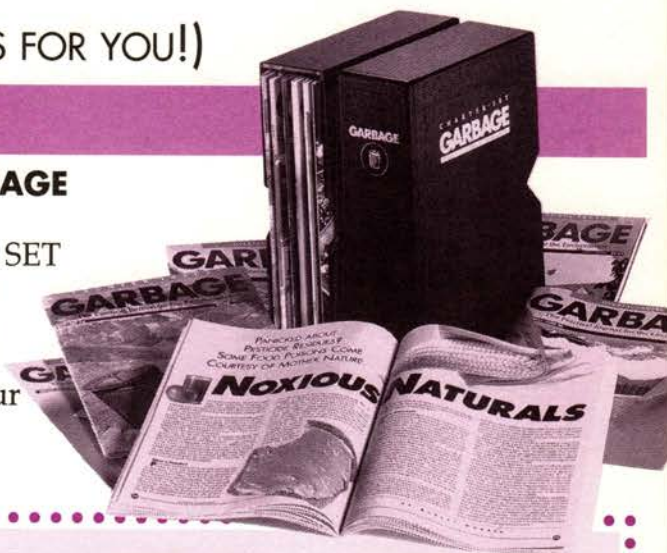
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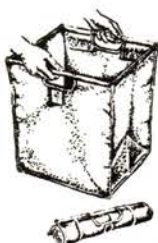
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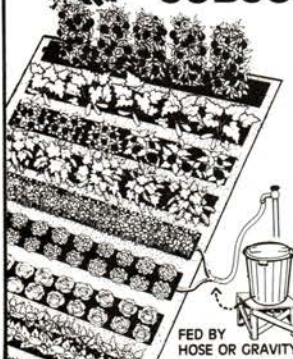
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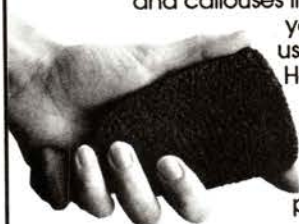
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ADVERTISERS' INDEX

READER SERVICE #	PAGE #	READER SERVICE #	PAGE #	READER SERVICE #	PAGE #
140	Action Packaging Systems.....25	131	The Energy Store.....27	136	Paper Plus Recycling, Inc.....66
97	AFM Enterprises Inc.....70		The Environmental Bag Company.....70	102	Paperboy Products.....25
163	Air Magnet.....60		Environmental Defense Fund.....77		Parnassus Fund.....5
157	Alonzo Printing.....25	73	Environmental Resource Project.....22	81	Patagonia.....Inside Front Cover
4	Alternative Energy Engineering.....73		Environmentally Sensitive Products.....79		
66	Atlantic Recycled Paper Co.....23		Equinox Ltd.....22	130	Pax World Fund.....22
164	Barclay Recycling.....19	83	Everybody Ltd.....60		Pelican Development Corp.....79
53	Berner Air Products, Inc.....13	8	E.L. Foust Company.....27		Penquin Books.....21
	Better World T-Shirts.....66		Funnybone.....75	160	Personal Statements.....67
	Biotech Building Systems.....79		Gilden Tree, Inc.....79	148	Photocomm, Inc.....61
95	Blue Rhubarb, Inc.....25	99	Globus Mercatus.....69		Piedmont Products.....26
173	Boyd's Office Products.....61	153	Green Cone Distributors.....60		Print Power Services.....73
57	Brush Dance.....62		Hyacinth House Publishing.....66	34	Real Goods.....18
152	Canvasack.....14	184	Integra Trading Company.....70	178	Relix Magazine Inc.....69
183	Carbo Industries Inc.....78	151	Integral Energy Systems.....70	12	Resource Conservation Technology.....67
	Cherry Tree.....75	177	Irrigo.....75	171	The Ribbon Factory.....14
63	Children's Television Workshop.....27,69	10	Island Press.....9		Schaefer Applied Technology.....15
109	Co-Op America.....21		J & J Associates.....73	14	Seventh Generation.....23
	Concept Environment Inc.....75		The Job Seeker.....14		Sierra Club Books.....73
	Conservation Concepts.....7	96	The Keeper.....62		Signature Marketing.....75
154	The Cottage Body Shoppe.....73	150	Kieffer Paper Mills, Inc.....26	41	Signs & Symbols.....78
	Coveside Conservation.....70		Laidlaw Environmental.....19		Sivalia Woodworks.....73
168	Crestwood Paper - Lynbar Enterprises.....13	100	Livos Plant Chemistry.....61	166	Sonoco Products Company.....13
5	Cross Pointe.....4		Lloyd Publishing, Inc.....75	174	Stop Junk Mail.....25
172	CSL & Associates.....60		Logona.....75	36	Sunelco.....62
6	Diversified Recycling Systems.....9		Marketing Associates.....70	90	Synchronos Design Inc.....61
	Earth Kit.....70	175	The Markuson Group Inc.....69	158	System One Filtration.....20
176	Earth "N" Us.....22	170	Message!Check Corp.....2		Teamwork Productions.....10,68
169	Earth Products.....19		MGB Press.....15	76	TreeKeepers.....9
	Earth Rising Productions.....62	142	Mini Flush Company, Inc.....11	180	United Marketing Inc.....12
181	Earth Works Press.....61	65	Robert Mitchell Associates.....60	186	Walnut Acres.....78
44	Earthwise.....62		Mr. Showerhead.....79	126	We Care - Earth Sense Inc.....15
133	Earthword, Inc.....67	137	N.E.E.D.S.....67	167	Wellman, Inc.....1
	Echo Hills Company.....75	179	N.O.P.E.....73		The Wilderness Society.....71
	Eco Source.....75	182	Native Enterprises.....23	11	Windsor Barrel Works.....14
119	Eco-Bags.....60		New Alternatives Fund, Inc.....27		Women's Choice.....70
86	Eco-Choice.....79	122	Ernest Ohl Enterprises.....62	22	Working Assets Funding Service.....Inside Back Cover
162	EcoPack Industries, Inc.....15	107	Orjene Natural Cosmetics.....21		



Gardening With Carburetors

Saturday in suburbia. With dawn comes the song of the bluebird — and the grinding of a garbage truck. Soon, all of nature's sounds are squelched by an angry, mechanical chorale: the baritone growl of Lawn Boy, the tenor whine of your neighbor's hedge trimmer, the soprano squeal of his weed-wacker. For this you escaped the noise of the city? And the smog?

Decibels aside, a lawn mower may pump out 50 times more pollution per horsepower than a typical truck engine. Their small, two-stroke engines, with their rudimentary carburetors and rich gas/oil mixtures, just aren't very good at cutting pollutants or conserving fuel.

In California, where hydrocarbons are taken seriously, they recently passed a law requiring manufacturers to cut emissions by 55 percent over the next ten years. No other state regulates what are known in the industry as "utility engines," even though catalytic converters and improved carburetors could dramatically reduce emissions.

There's a quiet, non-polluting alternative to all this, of course. Check out the hand mower described on p. 24. It may be a throwback, but think about it: It's lighter and never needs a fill-up.

Push one around the yard for an hour and you've burned over 400 calories. Sounds like progress to us.

In fact, hand-powered tools can tackle any lawn chore. (If they can't, your water-guzzling lawn is too big, anyhow. Let it go to seed.) Replace the mechanical hedge-clipper with shears. Instead of a gas-powered leaf blower, try a rake. It works, and you can pursue your thoughts in peace and quiet.

Famous gardens, from Babylon to Versailles to your Grandma's, were pruned without petroleum. It may take a little longer, but why are you rushing? Breathe deep and listen to the bluebirds.



SCOTT MACNEILL



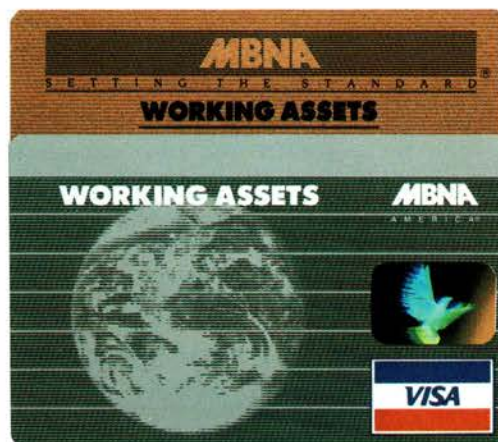
Randy Hayes, Executive Director, Rainforest Action Network

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Nevada's Other Watering Hole

Early in this century, workers dammed Nevada's Carson River into narrow irrigation canals. The event was hailed as a coup for progress. The reason: Some 77,000 acres of desert bloomed with garlic, alfalfa, even melons.

Workers clean an irrigation ditch (bottom), which delivers water to the Stillwater refuge.

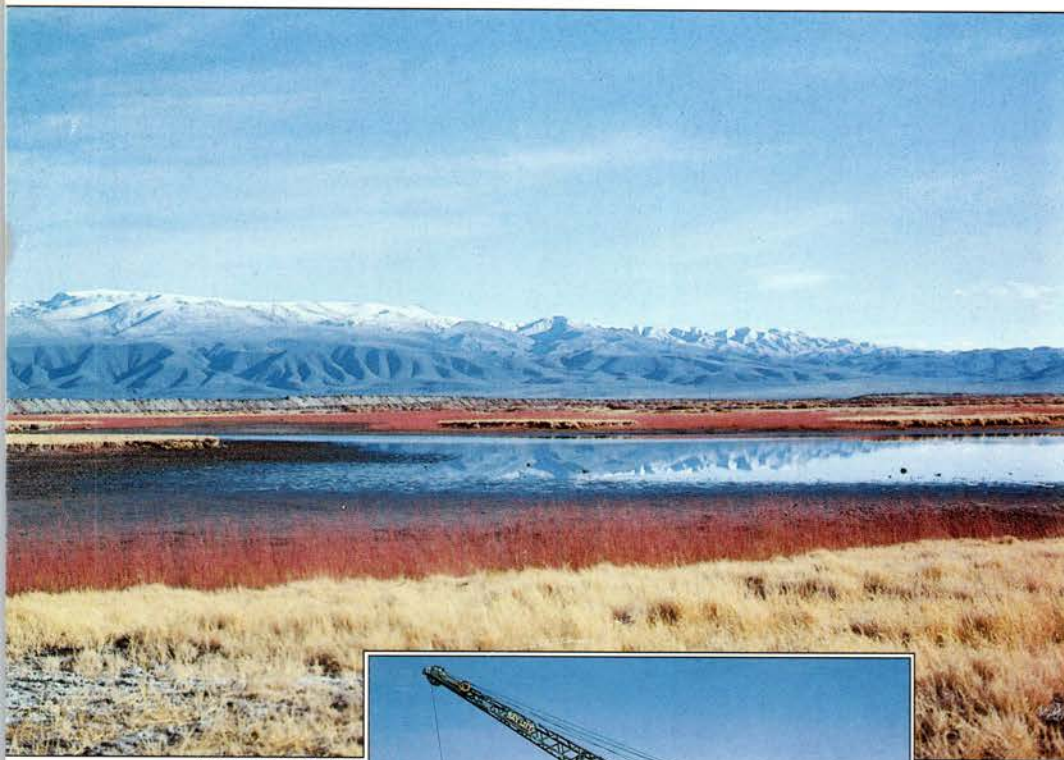
But there were losers. They were the thousands of migratory waterfowl — swans, great egrets, white-faced ibis, snow geese — that used to sail down and feed in the Stillwater National Wildlife Refuge, once laced with 80,000 acres of marshes fed by the river.

In the decades since the Carson was split up and sold, the refuge has only had legal rights to irrigation runoff flushed from farms. The runoff leaches from the dry earth a heavy load of natural toxins like arsenic, selenium, boron, and mercury. Summer evaporation leaves a concentrated brew that may have twice the salinity of seawater. In 1987 and '88, there were unexplained die-offs of fish and birds. By the summer of '89, just 4,000 acres of Stillwater were underwater.

But on Earth Day 1990, Stillwater got some refreshment. The Nature Conservancy, with other agencies, convinced a local farmer to sell Stillwater the rights to submerge 189 acres per year under a foot of water. The Conservancy's goal is to secure about \$50 million worth of water rights, enough to flood 25,000 acres.

As fresh water gurgles through the sluice gates into the refuge, it accomplishes something the birds won't ever notice: It dilutes and flushes away the toxins, making a safer food chain. What the birds on the flyway *will* notice is a growing oasis of greenery interspersed with gleaming mirrors. Seeing water, the travelers will again glide down from the sky in noisy thousands, to the rest area used by their ancestors for 12,000 years.

— Hannah Holmes



PHOTOS COURTESY USFWS

